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ABSTRACT

Eleventh- and twelfth-grade students in California comprehensive high schools and Regional Occupational Centers/Programs spend about one million hours a day on vocational education. California students who took a concentrated sequence of high school vocational subjects during 1981 had a 26 percent unemployment rate in the spring of 1982, compared to a 23 percent unemployment rate among all 16- to 19-year-olds and 27 percent unemployment rate among high school dropouts. Evidently, high school vocational training did not give students any relative advantage in finding jobs after they graduated, nor was it effective in dropout prevention. Furthermore, there is no evident way in which reallocating resources among existing high school vocational programs would bring about much improvement in labor market outcomes for graduates. Instead, fundamental changes should be made in vocational education at the secondary level. Comprehensive high schools should stop trying to provide skill training for entry-level jobs and instead should use vocational education to prepare young people for a working life of continual learning, problem solving, and communicating. To accomplish this broader purpose, vocational education should include all students at some point in their high school career. The success of vocational education in high schools should be measured by improved performance in academic subjects, lower dropout rates, and lifelong gains in productivity at work. (KC)

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One Million Hours A Day: Vocational Education in California Public Secondary Schools

David Stern, E. Gareth Hoachlander, Susan Choy, and Charles Benson

March 1986

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Policy Analysis for California Education

Policy Analysis for California Education (PACE) is a university-based research center focusing on issues of state educational policy and practice. PACE is located in the Schools of Education at the University of California, Berkeley and Stanford University. It is funded by the William and Flora Hewlett Foundation and directed jointly by James W. Guthrie and Michael W. Kirst. PACE has expanded to include satellite centers in Sacramento and Southern California. These are directed by Gerald C. Hayward (Sacramento) and Allan R. Odden (University of Southern California).

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Executive Summary

Eleventh and twelfth grade students in California comprehensive high schools and Regional Occupational Centers/Programs (ROC/ROPs) spend about one million hours a day on vocational education. This represents a large investment of student time and public money; yet vocational education has a potential that far exceeds its present performance.

California students spend more than twice as much time in high school vocational classes as in ROC/ROPs. Most vocational programs are offered in both places, though possibly at a more advanced level in ROC/ROPs.

California students who took a concentrated sequence of high school vocational subjects during 1981 had a 26 percent unemployment rate in the spring of 1982, compared to 23 percent unemployment among all 16 to 19 year-olds and 27 percent unemployment among high school dropouts. Evidently, high school vocational training did not give students any relative advantage in finding jobs after they graduated. Available evidence also did not reveal that vocational classes were effective in retaining would-be dropouts.

On the whole, vocational classes as currently offered in California comprehensive high schools are not demonstrably effective in helping students find jobs after they graduate, or in retaining would-be dropouts. Furthermore, there is no evident way in which reallocating resources among existing high school vocational programs would bring about much improvement in labor market outcomes for graduates.

We propose fundamental changes in vocational education at the secondary level. Comprehensive high schools should stop trying to provide skill training for entry level jobs--a task they are not well situated to do--and instead should use vocational education to prepare young people for a working life of continual learning, problem solving, and communicating. To accomplish this broader purpose, vocational education in high schools should include all students at some point in their high school career. It should be integrated with the academic curriculum, but at the same time engage students in producing something of real use. It should teach teamwork and encourage active inquiry. The success of vocational education in high schools should be measured by improved performance in academic subjects, lower dropout rates, and life long gains in productivity at work.

To provide training in specific job skills for high school students, ROC/ROP programs should continue. We recommend, however, that evaluation of these programs put less emphasis on job placement and more on students' attainment of measured competence.

In memory of

Charlotte Alhadeff

I. Overview

Vocational education, meaning preparation for jobs and careers in agriculture, distributive trades, health occupations, technical and industrial trades, office occupations, and occupational fields related to homemaking, is an activity of major proportions in California. In 1983-84, 234,202 students took vocational courses in public comprehensive high schools at the 11th and 12th grade levels.[1] (An even larger number of 9th and 10th graders took courses officially described as vocational education, mainly in subjects such as typing, home economics, and the exploratory type of shop course called "industrial arts"; however, in this report we are concerned with youth in the 11th grade and up.) For high school students and adults, California also offers vocational programs in regionally-administered agencies, called Regional Occupational Centers/Programs (ROC/ROPs). ROC/ROPs enrolled 99,986 students in the 11th and 12th grades in 1983-84 and 39,277 adults. Lastly, the community colleges served approximately 700,000 students in vocational subjects.

Our main concern in this report is the quality of vocational programs taken by 11th and 12th grade students in comprehensive high schools and ROC/ROPs. California students at this level are spending about one million hours a day on vocational education. This represents a large investment of student time--and public money.

We examine data to assess the usefulness of these investments. Our summary conclusion is that vocational education has a potential that far exceeds its present performance. We offer a number of proposals for reform of vocational education, the strongest of these referring to the programs conducted in comprehensive high schools. Our findings lead us to propose that the burden of preparing youth for entry-level jobs, i.e., the inculcation of job-specific skills, should be lifted from the high schools and carried in full by the ROC/ROPs. The comprehensive high schools would become providers of "enterprise training," involving students in actual production of goods and services. The basic point of our proposals, which we spell out in Section V, is to achieve two kinds of integration: enterprise and skill training on the one hand, and academic and vocational study on the other.

California's Hierarchical System of Vocational Education

With regard to depth or intensity of instruction, vocational education in California exists in a hierarchical pattern. This is by design. At the top of the hierarchy stand the community colleges. The size of most community college enrollments allows the colleges

[1] This estimate, as well as others given in this paragraph, were provided by the California State Department of Education.

to offer a considerable range of courses in a given occupational field; the large enrollment of the whole campus serves to bring enough students into even highly specialized courses to contain costs per student within tolerable limits. The permanent faculty of the campus is available to treat theoretical topics in depth. At the same time, the colleges rely strongly upon the services of part-time, untenured faculty, and the employment of such persons enables the colleges to meet shifts in labor market demands rather easily. If employers announce that they have openings for people to maintain numerically-controlled textile looms, a college can add staff to serve such a demand for a set of new courses by hiring textile machinery designers and mechanics part-time to serve as instructors. If the market demand for the particular skill slacks off, the contracts of those hired to teach textile machinery maintenance can be terminated. At their best, community colleges offer a unique combination of stability and flexibility in their approach to occupational training. This helps to maintain rigor in instruction, but it also allows the colleges to keep their programs timely. Among the institutions that provide vocational education in California, the community colleges have the further advantage of enrolling the most mature students.

Next in the hierarchy of vocational institutions, ranked by depth or intensity of instruction, stand the regionally-administered programs, the ROC/ROPs. Attendance in ROC/ROPs is commonly on a half-day basis for high school students. In Northern California (except San Francisco), the general pattern is to go to the home high school for three to four hours in the morning and to the ROC/ROP for two or three hours in the afternoon or vice versa. In Southern California, there is a strong practice to hold ROC/ROP sessions after the full high school day has been completed, e.g., in the later afternoon, evenings, or on weekends (San Francisco follows this latter practice in fair part). In earlier years, many ROC/ROPs held extensive programs in the summer, but these have been substantially curtailed.

ROC/ROPs are subject to rather detailed scrutiny by the State Department of Education, working out of three regional ROC/ROP offices. Courses must be approved and reviewed by the regional offices. New course applications are required to give documentary proof (a) that the skills to be taught are in demand and (b) that other institutions are not meeting that demand. Courses are also scrutinized by state offices with regard to duration and intensity. ROC/ROPs are expected to meet standards of student completions of programs and of placement of graduates in jobs.

The essence of the ROC/ROP program, however, is not to be found in its statewide administrative structure but in the fact that enrollment of students in ROC/ROP programs is strictly voluntary. Funding by the state--standard practice--is based on attendance, which is closely related to enrollment. Hence, the size of a given ROC/ROP's budget, from which many good things flow, is a direct function of its ability to attract students.

This gives an entrepreneurial cast to ROC/ROP administration. Somehow, the director and his or her faculty must convince an appropriate number of students (better yet, a

growing number of students) that enrollment in their ROC/ROP is "worthwhile." The most compelling evidence to offer is a statement that graduates of the given ROC/ROP get good jobs. The ROC/ROPs must sell their programs to students; in order to do this, they must sell the skills of their students to local employers.

If ROC/ROP staff are to sell the skills of their students to local employers, they are likely to have to meet a number of requirements of an entrepreneurial type.

1. They must keep in close touch with personnel officers, production managers, foremen in large firms, and owners of small firms (a) to know what hiring will be done in what fields in the near future and (b) to discover what specific skills, competencies, and attitudes the firms are looking for and how job prerequisites are changing, if they are.

2. They must be able to hire faculty who are completely up-to-date in methods of production.

3. They must provide students with a learning environment that is well-stocked with machinery or other implements of production; this equipment must be current and of a quality that is at least as good as what employees in local firms are presently using.

To sum up, leadership of the ROC/ROP requires (1) information and contacts, (2) good faculty, and (3) good equipment. In practice, these requirements are often dealt with simultaneously. In pursuing contacts with employers, ROC/ROP leadership may take the opportunity to hire outstanding skilled workers from local plants to serve as part-time faculty, and it may also succeed in obtaining access to modern production equipment for students' use, either as a gift, loan, or through establishment of a cooperative training program or community classroom. In either case, part of the instructional program would be conducted in employers' facilities.

The bottom rung of the vocational education hierarchy is occupied by programs that are embedded in and administered by comprehensive high schools. Two qualifications should be stated immediately. First, some vocational programs that are run by comprehensive high schools are exceptional by whatever criteria one may choose to reach a judgment. Second, we ourselves are postulating a hierarchy based on depth or intensity of instruction toward the objective of equipping students with entry-level skills for employment. This is not necessarily an appropriate objective for high schools, as we shall argue later.

In any case, the financial incentive structure does not establish any strong entrepreneurial spirit toward vocational education in comprehensive high schools. Students in the 11th and 12th grades attend high school for a variety of reasons: to go to college, to earn a diploma regardless of plans for further education, to please their parents, to have an active social life, to avoid the physical dangers of street life, or to forego the stigma of being a dropout. Whereas some vocational educators may believe otherwise, the evidence that availability of vocational courses in high school prevents students from dropping out is

simply not strong (see Section II). Hence, the amount of money received by a school district for attendance generated in a particular high school is likely to be affected only slightly by the scope and quality of the vocational program in that high school. Even if it were so affected, there is no assurance that the district office would turn the money over to the high school that earned it.

There are other problems for vocational education in comprehensive high schools. Faculty are almost altogether full-time and tenured. This means that high schools, unlike ROC/ROPs, lack flexibility in staffing to meet changes in labor market demand for skills. Faculty ordinarily do not have expense accounts to go out and keep in close touch with local employers; often they do not even have easy access to telephones to make placement calls for their students--especially to respond to anyone returning a call. Compared to ROC/ROPs and community colleges, the amount of money available to buy equipment for vocational programs in comprehensive high schools is meager.[2]

Let us review the hierarchical structure of vocational education from the point of view of a student who wants to prepare for a job in the field of electronics. A community college in the Bay Area offered the following courses in 1984-85:

Fundamentals of Electronics
Electronics Soldering Techniques
Passive Circuits and Devices
Applied Electronic Mathematics
Active Electronic Devices and Circuits
Electrical/Mechanical Assembly Technology
Analysis of Linear Circuits
Modulation/Demodulation and Signal Processing Systems
Introduction to Microprocessors
Electrical/Mechanical Assembly Technology II
Advanced Circuit Applications
Micro-Computer Interfacing
Radio-Frequency Communication
Active Circuits and Devices
Applied Linear Amplified Analysis
Applied Electronics Circuit Analysis
Microwave Principles

In the same academic year, a nearby ROC/ROP offered four courses (only):

Electronics Design and Manufacturing I & II. This course is designed to prepare students for employment in the electronics industry.

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[2] In one high school we visited, two classrooms for office occupations were side by side, one run by a ROC/ROP and the other by the home high school itself. The ROC/ROP classroom had a word processor at each student station. The classroom administered by the comprehensive high school had manual typewriters--two generations of equipment behind.

> Students will learn basic electronics theory and applications. This class will emphasize robotics, computers, design, and construction of projects.
>
> Electronics Systems Analysis and Repair I & II. This course is designed to prepare students for employment in the electronics industry. Students will learn basic electronics theory and application. This course will emphasize hands-on trouble-shooting, analysis of analog, digital, operational amplifiers, and other related electronic technologies.

A large comprehensive high school in the Bay Area, commonly regarded as one of the leading institutions in the state, had no course in electronics in its vocational program. For the students seeking a job in the electronics field, possibly the course most closely related would have been this one:

> Machine Shop. A laboratory course in which students learn to use the lathe, milling machine, drillpress, and other equipment commonly employed in the manufacture of parts for industrial machinery. Projects involve the cutting of various metals and plastics to specified shapes with a high degree of precision. Students learn to work from blueprints and to read micrometers and other measuring devices used in the machinist trade. This course is designed for students seeking basic grounding in an industrial trade or entry into mechanical engineering.

If vocational courses in the comprehensive high school improved the prospects of students to enter post-secondary education, or really provided students with the skills to get a well-paying job quickly upon graduation from high school, or even if the vocational courses served as a dropout preventive, one might suggest that the courses be maintained in their present form. Evidence we have seen, and new evidence presented in this report, do not establish a case for preserving most of these courses in comprehensive high schools.

Indeed, we believe it is possible that there are some negative outcomes associated with vocational courses administered by comprehensive high schools. These courses may be used as a holding room for students who are judged to be slow or not highly motivated toward academic studies. Moreover, because it is claimed that vocational courses lead to jobs, students may become imbued with a false sense of security, to the point of thinking that they are doing something worthwhile for their lives. But in the meantime, the amount of academic work they do is reduced, resulting possibly in permanent damage to their careers.

Vocational classes in comprehensive high schools often give students opportunity to do something useful, concrete, and practical. All students--not only those who are judged to be slow in academic subjects--can benefit from this kind of opportunity. But such experience should reinforce the academic curriculum, not exist in a separate curricular track. The aim of vocational education in comprehensive high schools should not be to provide students with specific skills for certain entry-level jobs; this is something the high

schools are not well-situated to do. Instead, the aim should be to prepare people to use their heads at work: to acquire information, to communicate, to think. The next three sections of this report provide evidence in support of these assertions, and the final section explains our recommendations in more detail.

II. Review of Previous Research on Effectiveness of Vocational Education

Labor Market Outcomes

In 1980 the National Center for Research in Vocational Education published a systematic survey of studies on the outcomes of participation in vocational education (Mertens and others, 1980). The survey covered more than two hundred published and unpublished studies from 1968 to 1979. Outcomes of vocational education included earnings, unemployment rates, basic and occupational skill attainments, postsecondary training, and whether vocational education graduates were satisfied with their training. The authors concluded (p. xiii):

1. No differences in unemployment rates were found for high school graduates of vocational education programs as compared with nonvocational programs. Postsecondary vocational graduates have somewhat lower unemployment rates than nonvocational postsecondary graduates.

2. A majority of secondary and postsecondary vocational graduates did find jobs in training-related areas.

3. The results of studies of earnings of vocational education graduates and nonvocational graduates could not be generalized; however, trade and industry graduates at the secondary level and technical graduates at the postsecondary level have higher earnings than graduates of other vocational education programs.

4. Vocational students are below academic students but above or the same as general curriculum students in terms of basic skills attainment and academic abilities.

The authors further reported, however, that there are serious methodological problems with the research on the outcomes of vocational education: neither administrators' nor students' reports adequately describe the differences in programs or curriculum, and earnings variables are highly affected by such factors as degree of unionization and state of the economy. Isolation of the effects of participation in vocational education alone is clearly made suspect by such factors. These factors will generally "...tend to obscure rather than enhance differences among curricula. The differential effects of the separate curricula must be fairly powerful to be detected with existing methods" (p. 17).

A different kind of research synthesis was commissioned in 1980 by the National Institute of Education and conducted by the Huron Institute (U.S. Department of Education, 1981, Chapter VII). This study reanalyzed data from three national longitudinal surveys. It measured labor market success among young workers who had exactly 12 years of schooling, and compared graduates from high school vocational programs with graduates from the general (neither vocational nor pre-college) curriculum. It found that young women who graduated from business and office programs worked more hours and

earned more money per week than women who graduated from the general curriculum. Among young men, there were some advantages for white vocational graduates in their first year out of school, but these diminished three years later. Most differences between male vocational and male general curriculum graduates were small and inconsistent.

The Huron Institute study relied mainly on high school graduates' own reports of whether or not they were in vocational programs. However, these reports are not always accurate. A more accurate classification can be obtained from students' high school transcripts. Two studies have used high school transcript data, along with information about labor market experience after graduation, to measure the consequences of vocational education. One study was by Rumberger and Daymont (1982), the other by Meyer (1981a).

Rumberger and Daymont (1982) used data from the new youth cohort of the National Longitudinal Surveys (Center for Human Resource Research, 1983). Annual surveys of this cohort began in 1979, with interviews of approximately 12,000 men and women between the ages of 14 and 21. Complete high school transcripts were obtained for 6,591 of the 8,420 respondents who were 17 to 21 years old in 1979 and who had last attended high school in the United States. Rumberger and Daymont further restricted their sample to 1,857 respondents who were not full-time students at the time of the 1980 interview and who had completed 9 to 12 years of schooling. Another 500 cases had to be omitted due to missing data, so the analysis finally included only about 10 percent of the full sample.

The advantage of being so selective is that Rumberger and Daymont were able to identify students who had taken a whole program in one of six vocational areas: agriculture; distributive education; health occupations; home economics; office occupations; and technical, trades, and industrial occupations. They defined a program as three or more credits in one of these fields. Their data (Table 1) show proportions of students in each program who became employed in jobs related to their training. Programs in office occupations, distributive education, health occupations (for women), and agriculture (for men) appear most likely to lead to related employment.

Rumberger and Daymont show that the estimated payoff from vocational education depends on how participation in vocational education is measured. Dependent variables are the logarithm of hourly earnings in the 1980 survey week, the number of weeks unemployed in the previous year, and the number of hours worked in the previous year. Independent variables included as controls were race (black or Hispanic), ninth grade GPA, number of months since leaving school, whether married with spouse present, number of children, parents' education, and a "cultural index" for the family of origin. Their data show that *the estimated payoff from taking more vocational education credits is always greater if those credits are part of a program and the student becomes employed in a field related to that program.* One finding is especially interesting: "used" vocational program credits have a greater estimated effect on women's hourly pay than academic

Table 1

Percentages of Students Taking (or Not Taking) Vocational Programs in Specific Areas Who Obtained a Job in an Occupation That Corresponded to That Area, by Specific Area and Sex

Vocational and occupational area (# of students in program)*	Vocational program status: Specific program indicated	Vocational program status: Other program or no program
	Men	
Agriculture (40)	42	17
Distributive education (16)	38	27
Health occupation (0)	-	5
Home Economics (13)	4	6
Office occupation (16)	54	19
Trade and industry (191)	65	59
	Women	
Agriculture (9)	3	7
Distributive education (16)	66	28
Health occupation (16)	40	6
Home Economics (97)	15	13
Office occupation (248)	60	35
Trade and industry (34)	26	32

*The entries for the number of students in a program are unweighted while the main entries are weighted percentages.

Source: Rumberger and Daymont (1982).

credits, though academic credits in one equation have a bigger effect than vocational credits in general. This makes it possible to say that, for women in this sample, vocational credits have a bigger payoff than academic credits in terms of all three economic outcomes, provided the vocational credits are part of a program and the women find employment in a field related to that program.

For men, results are more mixed. Vocational credits in a program that is used do have a bigger effect than academic credits on total hours worked, but not on raising hourly earnings or reducing unemployment.

Rumberger and Daymont tried to estimate whether the effect of credits in vocational programs depended on *which* program students took, but the numbers of students in most programs were too small to make reliable comparisons between programs.

One drawback of this study is that it combines high school dropouts and graduates, and the analysis does not control for that. Another is that unmeasured influences on whether students have taken vocational courses may also affect labor market outcomes, so the estimated "effects" of vocational education on employment may be biased.

In another study using course transcripts, Meyer (1981a) estimated effects of vocational education on the employment of high school graduates who had no postsecondary schooling. His sample consisted of 2,431 women and 2,022 men, out of the original sample of 23,000 high school seniors in the National Longitudinal Study of the Class of '72. Data were available for eight years after graduation. Dependent variables were hours and earnings for the first week of October and total weeks worked since the previous October.

The base year survey included a Student Record Information Form addressed to the school, which recorded the number of courses each student took in specific subjects. The six vocational subjects were agricultural, business or commercial, distributive education, health occupations, home economics, and trade or industrial occupations. For women, Meyer looked at commercial, home economics, and "technical," which combined the remaining four. For men, he looked at trade and industrial, commercial, and other. Meyer did not try to determine whether courses were part of a "program"; his predictor variables were simply the ratio of vocational education courses in the various fields to the total number of courses taken in high school. Control variables were number of hours worked per week while in high school (a strong positive predictor of successful employment after high school), whether black or Hispanic, a test score, class rank, parents' income, whether married and with dependents in 1973 and 1979, whether respondent lived in a town/urban/rural area and in the south/east/west, and the local unemployment rates and average wages in 1973 and 1979.

Meyer found that the estimated effects of commercial courses on employment and earnings were consistently positive for women. The effects diminished after five years but remained positive through the whole eight-year period for which data were available. Women who took a lot of home economics, on the other hand, earned consistently lower hourly wages. Other vocational courses appeared to have no consistent effect for women.

For men, courses in trades and industrial occupations had a slight positive effect on hourly pay. Other vocational courses had no consistent effect.

In Meyer's sample, women had taken an average of 29 percent of their high school course work in commercial subjects. The standard deviation was 19 percentage points. Meyer computed the predicted gain from a 2-standard-deviation increase--that is, an increase of 38 percentage points--in the proportion of total coursework taken in commercial subjects for a woman with average pay and average hours and weeks worked. The predicted gain in annual earnings would be 16 percent, of which 3.5 percent comes from higher predicted hourly wages and the rest is due to a larger predicted number of hours and weeks worked. (Meyer implicitly assumes that the courses for which the extra commercial courses are substituted had no effect on employment or earnings.)

A similar simulation for men, in which the proportion of courses in trades and industrial occupations was increased by 34 percentage points (the mean is 19 percent), resulted in a predicted gain in annual earnings of only 3 percent.

A drawback of Meyer's study is that he did not determine whether or not students found jobs in the fields for which they trained. Also, unmeasured variables may have affected both vocational course enrollment and labor market outcomes, so that estimated "effects" would be biased.

In at attempt to measure the payoff from vocational training over a longer period--up to 15 years after high school graduation--the National Center for Research on Vocational Education conducted a national survey in 1981 (Mertens and Gardner, 1983). The sample consisted of individuals between the ages of 20 and 34, who were employed or looking for work. Graduates of some vocational programs initially earned more money per week than graduates from the general curriculum. However, the initial differences were not statistically significant, and they also diminished over time.

To summarize, previous research has not found strong or consistent gains in employment and earnings for graduates of high school vocational programs. Gains appear to be greater for students who take a concentrated set of vocational courses in a particular area and then find employment in that area. However, gains from vocational training appear to diminish over time. For high school students who do not go on to college, an academic course of study combined with part-time employment apparently provides better preparation for the job market than taking vocational courses.

Dropout Prevention

Even though the evidence generally shows that vocational education gives high school students little, if any, advantage in the labor market, vocational education might still have important value for students who like their education to be practical, concrete, and useful. To perform practical activities like raising crops or livestock, running a restaurant, or repairing cars, students may have to exercise and improve their skills in reading, computing, or problem solving. They may also have to acquire new information about academic subjects. Vocational classes can thus provide academic education with a practical theme. It is often said that a substantial number of students would quit high school if such an alternative to the predominantly abstract approach of academic classes did not exit.

For example, former Secretary of Education--then Commissioner of Education--Terrell H. Bell urged Congress to take this broader view of vocational education in 1975, after the General Accounting Office (GAO) criticized the lack of labor market benefits from the program. Bell stated:

> Although we will make vocational education as responsive as possible to the labor market, it would be erroneous to judge the success of all vocational education by this criterion alone, as the GAO report does. We feel vocational education programs should be perceived as an integral part of the educational system of this country. As part of an educational system as opposed to a trainee system, vocational education is responsible for assisting in increasing and improving basic cognitive skill, heightening career awareness, improving the understanding of a variety of work environments, and in many instances, actually *motivating students to remain in school at the secondary or postsecondary levels* as well as providing special occupational skills. (Hearings before the House Subcommittee on Elementary, Secondary, and Vocational Education, Feb. 19, 1975; pp. 308-309. Emphasis added).

The best empirical study of whether vocational education actually does motivate some students to remain in high school has been done by Mertens (1982), using data from The National Longitudinal Survey of Youth Labor Market Experience (Center for Human Resource Research, 1983). This study concentrated on individuals in the sample who were 18 years or older in 1980 and for whom there was information on highest grade completed, enrollment status, and courses taken since 9th grade. In addition to school data, there was a great deal of information about the personal characteristics of these youngsters, their family backgrounds, and their personal experiences.

In order to test for the effect of participation in vocational education on persistence in high school, Mertens analyzed dropping out at the end of the 9th, 10th, and 11th grades. Participation in vocational courses was measured by credits reported on course transcripts. The sample group was divided into two equal-sized subgroups: one with a low predicted probability of dropping out, and one with a high predicted probability of dropping out. This division was based on earlier studies that have shown an association between

dropping out and certain personal characteristics, family background factors, and demographic variables.

Mertens's data (Table 2) show dropout rates for both the high and low probability groups, for grades 10, 11, 12, and for three different levels of vocational education participation. For vocational education between zero and less than three credits, dropout rates increased; for more than three vocational education credits, however, the dropout rates were below the level of those who had more than zero but less than three vocational education credits.

In order to control more precisely for personal and background characteristics known to be associated with dropping out, the authors analyzed the dropout rates for the high probability group for each grade level using a linear regression model. The regression equation includes race or ethnicity, sex, aspects of marriage and child-bearing, test scores, and socio-economic status. When these control variables are included, increasing participation in vocational education significantly reduced the probability of dropping out in grades 10 and 12. The coefficient of vocational education credits for grade 11 was negative but not significant. One vocational education credit in grade 9 reduced the probability of dropping out of grade 10 by one-tenth of one percent, one vocational credit in grade 11 reduced the probability of dropping out of grade 12 by two-hundredths of one percent. Thus, other things being equal, increased participation in vocational education decreased the probability of dropping out, but only by a small amount.

This careful study suggests that the vocational education curriculum does increase retention rates in high school, but that the effect is small. One reason for the small holding power may be the absence in many high schools of opportunities to enroll in vocational education programs until the 11th or 12th grades. Thus, increasing the number of vocational education programs that are open to 9th and 10th graders might be one way to reduce high school dropout rates.

Another study of the relation between vocational education and dropout rates surveyed 17 successful dropout prevention programs that incorporated either vocational education or work-experience components (Lotto, 1982). Success was defined by empirical evidence that the program either reduced the dropout rate or improved the attendance rate. The survey found that 10 of the 17 successful programs emphasized individualized instruction and close relationships between students and teachers. In 13 of the 17 cases, the program matched vocational education with instruction in basic skills. In 12 of these 13 programs, career counseling was also supplied. In other programs, additional support services were included. Thus, the common element in these successful vocational programs is a multi-strategy approach that simultaneously addresses the many problems of dropouts.

Table 2

Dropout Rate by Grade Level, Probability of Dropping Out, and Amount of Vocational Education

Amount of Vocational Education		*Grade Level and Probability of Dropping Out*								
		10			11			12		
		Low	High	Total	Low	High	Total	Low	High	Total
No Voc.	%	0.1	3.9	1.6	0.0	6.6	2.5	0.7	11.0	4.0
	n	50	2531	2581	23	2028	2051	187	1281	1568
Less than three credits	%	0.2	6.6	3.0	0.5	11.9	5.4	0.8	16.4	6.8
	n	79	1971	2050	321	5478	5799	502	6248	6750
Three or more credits	%	0.0*	-	0.0*	0.0*	7.3	4.5	0.0	12.3	5.6
	n	0	-	0	0	56	56	0	827	827
Total	%	0.1	4.7	2.0	0.3	9.7	4.1	0.7	14.7	6.0
	n	129	4502	4631	344	7562	7906	689	8456	9145

Note: The frequencies (n) represent the weighted population in hundreds. Respondents with no transcript data for a particular year were assigned to the mean for that grade level.

* Indicates that fewer than twenty-five actual cases were used as the base for calculation.

Source: Mertens (1982)

III. Vocational Student Hours and Teacher Salaries in California Public High Schools and ROC/ROPs

California students and teachers are spending about one million hours each day on vocational education in public high schools and Regional Occupational Centers and Programs (ROC/ROPs). This is about one-sixth of the total time spent in public secondary schools. These numbers come from the Professional Assignment Information Forms filled out by teachers in October 1981, for the California Basic Educational Data System (CBEDS). We begin our analysis of this data by breaking it down between high schools and ROC/ROPs, and among 18 instructional programs.

Definition of Vocational Programs

Instructional programs are defined as follows (numbers in parentheses are assignment codes from the Professional Assignment Information Forms).

1. Agriculture consists mainly of classes in agricultural production (4000), agricultural mechanics (4002), ornamental horticulture (4004), introduction to agriculture (4007), and "other" agricultural courses (4098). Each of these course titles accounts for roughly one-fifth of the classes in this program.

2. Distributive education includes courses in various retail service areas. General merchandise (4107) accounts for half the classes in this program. "Retail trade, other" (4119) is the next most common assignment in this area, accounting for one-sixth of the classes.

3. Practical nursing includes classes in nursing (4206), practical (vocational) nursing (4207), and "other nursing" (4210). A practical nurse is trained to give direct nursing care under the supervision of a nurse or physician.

4. Nurses' aide consists of nursing assistant (aide) courses (4208). An aide is trained to perform simple tasks involved in the personal care of individuals receiving nursing services.

5. Child care includes classes in child development (4311) and care and guidance of children (4400).

6. Clothing consists mainly of courses in clothing and textiles (4302), with a few classes in clothing management, production and services (4401), and textile production/fabrication (4840).

7. Of the classes comprising the food program, 70 percent are food and nutrition (4305), and 19 percent are in food management, production, and services (4402). The rest are scattered among food distribution (4105), food services (1106), and quantity food occupations (4836).

8. Accounting & computer consists mainly (78 percent) of courses in accounting and computing occupations (4600), with some classes for computer and console operators (4601) or programmers (4602), and a few in other business data processing (4603).

9. Office occupations consists almost entirely (97 percent) of courses in "filing, office machines, clerical occupations" (4604), with a few "other" office classes (4698).

10. Similarly, 97 percent of courses taught in the general secretarial program are in stenographic, secretarial, and related occupations (4608). This instructional program differs from the office occupations and typing programs because it provides some training in written communications.

11. Typing is typing and related occupations (4610).

12. Auto mechanics includes automotive mechanics (4510) and auto mechanics (4803).

13. Drafting is drafting (4502) or drafting occupations (4817).

14. About two-thirds of the courses in machining & metals are in metals (4508). Of the rest, most are in welding and cutting (4829) or machine shop (4826). There are a few classes in machine tool operation (4827), sheet metal (4828), tool and die making (4830), other metalworking occupations (4831), and other industrial arts (4598).

15. The most common courses in construction are carpentry (4811) and other construction and maintenance trades (4848), each accounting for about one-fifth of the total. The remaining are classes in construction (4500), electricity (4812), masonry (4813), plumbing and pipefitting (4814), or other trades and industry courses (4898).

16. Wood is woods (4512) or woodworking occupations (4843).

17. Other high tech is a grouping of courses not included in any of the preceding programs, and which have titles that suggest relatively sophisticated equipment or theory. Courses in electronics (4503, 4706, and 4819) account for 28 percent of this group, and graphic arts courses (4505 and 4822) are 27 percent. Photography (4506) is 11 percent. Power mechanics (4511) and automotive technology (4702) are each another 4 percent. The rest are scattered among 39 course titles, none of which by itself represents more than 3 percent of the courses in this group.

18. Other is a residual category in which "other office" courses (4698) account for 19 percent and "other health" courses account for 11 percent of the classes. Body and fender repair (4802) is 8 percent. General industrial arts (4504) and barbering/ cosmetology/personal services (4833) are each 7 percent. Industrial crafts (4501) and other industrial arts (4598) are each 6 percent. Other home economics-related occupational preparation courses (4498) are 5 percent. Dental assistant (4200) and public service occupations (4835) are each 4 percent. Forestry (4006) is 3 percent. The remaining classes are scattered among 19 other course titles, none of which accounts for more than 3 percent.

Counting Teachers, Salaries, and Student Hours

The list of course titles and assignment codes is part of the CBEDS Professional Assignment Information Form. Teachers are asked to pick the course title that best describes each of their classes. They are also asked to report the percentage of their time spent teaching each class, and the numbers of male, female, handicapped, educationally disadvantaged, and limited-English-proficient students in each class. Finally the form asks for certain information about the teachers themselves, including annual salary, educational attainment, year of birth, years of professional service, sex, and ethnicity. As with any questionnaire, perfectly accurate reporting cannot be expected.

Table 3 shows the total reported numbers of full-time-equivalent (FTE) teachers and student class hours, and the numbers in each instructional program. Since the number of class periods taught each day by a full-time teacher varies between districts and even between schools in the same district, the number of FTE teachers is first computed in each place, then added together for the whole state. In each district or school the number of FTE teachers in each program is computed by dividing the number of daily class periods taught by a full-time teacher into the total number of class periods taught in that program. (In most places a full-time teacher has five or six class periods per day. In ROC/ROPs the number was taken to be five. The statewide mean for vocational teachers is 5.4.) For example, if a district offers 30 class periods of typing a day, and a full-time teacher in that district teaches six class periods a day, then five FTE are counted as typing teachers, even if the actual number of people teaching typing is more than five, with some teaching it part-time.

The amount of teachers' salaries allocated to each program is computed for each teacher as the total salary multiplied by the fraction of time spent teaching in each program. This is then added together for all teachers in the program.

The number of daily student class hours in each program is simply the total number of students who each spend one class period a day in that program. If 25 students spend two daily class periods in a drafting course, they are counted as 50 student class hours per day. This is a much more precise way to count students' participation in specific programs than trying to construct measures of "unduplicated enrollment."

Table 3

Student Class Hours, Teachers, and Salaries in California Regional Occupational Programs (ROP) and Public High School (HS) Vocational Classes, by Instructional Program, October 1981

Program	Annual Expenditure on Teachers' Salaries per Daily Student Class Hr.			Total Daily Student Class Hours			Estimated Total Number of Teachers (FTE)			Estimated Mean Teacher's Salary per FTE	
	All Secondary	ROP	HS	All Secondary	ROP	HS	All Secondary	ROP	HS	ROP	HS
1. Agriculture	$186	$201	$181	62,771	16,152	46,619	549	170	379	$19,219	$22,456
2. Distrib. Ed.	174	171	184	32,219	24,008	8,211	292	227	65	18,315	23,876
3. Practical Nursing	302	233	422	3,580	2,272	1,309	52	26	26	21,268	21,390
4. Nurse's Aide	188	180	229	11,380	9,590	1,791	121	104	17	16,668	24,490
5. Child Care	174	175	173	25,711	7,777	17,934	211	72	138	19,065	22,767
6. Clothing	181	158	183	28,068	1,354	26,714	228	15	214	14,738	23,024
7. Food	175	202	168	57,101	11,846	45,255	469	129	340	18,643	22,460
8. Accounting & Computer	148	121	164	69,057	25,260	43,797	499	209	290	14,749	24,825
9. Office Occupations	173	176	172	53,268	12,892	40,376	403	115	287	19,869	24,370
10. General Secretarial	186	175	189	28,155	6,367	21,789	227	56	171	20,036	24,164
11. Typing	142	142	143	108,238	7,307	100,931	661	60	601	17,385	23,990
12. Auto Mechanics	177	175	178	77,958	20,894	57,064	631	184	446	20,013	23,035
13. Drafting	184	185	184	52,976	3,670	49,306	403	36	367	18,736	24,805
14. Machining & Metals	184	150	196	54,872	15,273	39,599	450	132	317	17,371	24,556
15. Construction	156	144	193	21,719	16,305	5,414	204	157	47	14,946	22,141
16. Wood	187	207	187	66,609	1,981	64,627	523	18	505	23,474	24,121
17. Other High Tech.	179	170	185	103,066	41,848	61,219	855	378	477	18,921	23,719
18. Other	154	131	170	126,307	51,257	75,050	1,014	453	561	14,918	22,809
Total	$170	$160	$174	983,059	276,053	707,006	7,792	2,541	5,248	$17,540	$23,625

Source: CBEDS

Finally, teachers' salaries per daily student class hour is just total teachers' salaries divided by total daily student class hours, and teachers' salaries per FTE is total salary divided by total FTE.

Table 3 shows that students spend more than twice as much time in high school vocational classes than in ROC/ROPs. High schools occupy more than 90 percent of student class hours in typing, drafting, clothing, and wood. These four programs account for one-third of student hours in high school vocational classes. ROC/ROPs occupy more than 75 percent of student hours in construction, distributive education, and the two nursing-related programs. These programs account for just less than one-fifth of the student time spent at ROC/ROPs. So to some extent the ROC/ROPs and high schools specialize in different programs, but mostly they overlap.

Differences Between High School and ROC/ROP Vocational Teachers

ROC/ROPs generally spend less than high schools on teachers' salaries per student class hour. The reason for the difference appears to be lower salaries per FTE teacher in the ROC/ROPs, though the estimated numbers of FTE and salaries per FTE in Table 3 may exaggerate the actual diffference. As explained above, the number of daily class periods taught by a full-time teacher was not reported in the data, and therefore had to be imputed. For high schools, the imputed number was the modal number of class periods reported by full-time teachers in each district or school. For the ROC/ROPs, the number was simply taken to be five. If it were six, the estimated total number of FTE teachers in ROC/ROPs would be only 2,118, and the mean salary per FTE would be $21,048. Even so, the mean full-time salary in ROC/ROPs would be less than in high schools. ROC/ROP salaries per FTE are sufficiently lower that they offset a higher ratio of FTE teachers to student class hours, resulting in the lower expenditure on teachers' salaries per class hour reported in Table 3.

Some of the reasons why ROC/ROPs pay lower salaries are suggested in Table 4. Their teachers have fewer degrees and less seniority. This places them lower on the salary ladder. ROC/ROPs also have larger proportions of blacks, Hispanics, and women, whose alternatives in the labor market would on average pay less than those of white males. A much larger percentage of ROC/ROP staff are teaching part-time. Some may teach part-time in the ROC/ROP and part-time in the high school vocational program, but the fraction of part-time high school teachers is so small that no more than a third of the part-time ROC/ROP teachers could also be teaching in high schools, and the actual number is probably much less. More likely, part-time ROC/ROP teachers are spending the rest of their working time in an occupation related to what they teach, though we have only anecdotal evidence of this. The fact that ROC/ROP teachers on average have about seven years less seniority in their teaching positions but are only a year and a half younger than their high school counterparts also suggests that they have more experience in occupations

Table 4

Characteristics of California Teachers in Regional Occupational Programs (ROP) and Public High School (HS) Vocational Classes, by Instructional Program, October 1981

Program	Mean Years of Professional Service in Current District		Proportion With Master's degree or More		Proportion Without bachelor's degree		Mean Age		Proportion Black		Proportion Hispanic		Proportion Part Time		Proportion Female	
	ROP	HS	ROP	HS	ROP	HS	ROP	HS	ROP	HS	ROP	HS	ROP	HS	ROP	HS
1. Agriculture	5.2	8.8	.29	.40	.18	.01	35.7	36.8	.04	.01	.02	.03	.40	.07	.22	.12
2. Distrib. Ed.	5.0	12.3	.20	.42	.50	.02	39.4	41.4	.11	.06	.04	.04	.32	.04	.57	.33
3. Practical Nursing	6.6	4.5	.18	.04	.20	.05	42.7	32.9	.20	.11	.11	0	.14	.02	.92	.74
4. Nurse's Aide	4.8	9.0	.13	.36	.52	.09	43.0	46.7	.13	.38	.03	.03	.30	.07	.99	.87
5. Child Care	5.5	10.4	.24	.36	.18	.01	39.5	41.3	.03	.04	.05	.03	.37	.07	.97	.98
6. Clothing	5.9	12.9	.09	.26	.54	.01	45.5	42.4	0	.07	.14	.03	.28	.06	.93	.99
7. Food	4.7	11.0	.09	.28	.47	.01	39.9	41.1	.04	.06	.04	.03	.22	.06	.53	.97
8. Accounting & Computer	5.6	14.7	.23	.51	.40	.01	39.3	44.9	.10	.04	.09	.01	.27	.03	.61	.35
9. Office Occupations	6.8	13.5	.30	.46	.23	.02	40.3	43.8	.13	.06	.06	.03	.32	.03	.77	.56
10. General Secretarial	6.0	13.7	.33	.43	.16	.01	44.0	45.2	.02	.05	.04	.04	.40	.06	.91	.82
11. Typing	6.1	14.0	.25	.49	.20	.00	43.1	44.6	.08	.07	.06	.03	.21	.04	.87	.55
12. Auto Mechanics	6.4	11.6	.13	.34	.43	.06	40.6	41.3	.05	.03	.08	.06	.25	.05	.01	.01
13. Drafting	5.9	15.9	.26	.51	.30	.01	40.7	45.2	.14	.02	.15	.04	.32	.04	0	.01
14. Machining & Metals	5.7	13.9	.16	.41	.56	.02	42.0	43.7	.03	.02	.15	.06	.22	.04	.00	.00
15. Construction	4.7	10.5	.13	.33	.61	.11	43.5	43.9	.06	.02	.04	.08	.21	.04	.01	.05
16. Wood	8.6	13.7	.24	.41	.23	.02	41.1	43.0	0	.02	.01	.05	.57	.02	0	.00
17. Other High Tech.	5.7	12.8	.18	.42	.51	.07	41.4	43.5	.09	.04	.08	.05	.32	.05	.19	.04
18. Other	5.6	11.7	.13	.34	.60	.02	42.8	41.0	.09	.05	.12	.05	.25	.04	.49	.60
All Programs	5.6	12.7	.18	.40	.45	.02	41.0	42.6	.08	.04	.07	.04	.29	.04	.42	.36

Source: CBEDS

other than teaching. The ROC/ROP staff are less established in the teaching profession but probably more established in the occupations they teach.

Table 4 reveals a virtual absence of female teachers in the "trades and industry" programs: auto mechanics, drafting, machining & metals, construction, and wood. Almost the opposite is true in the nursing, child care, and clothing classes. In office-related programs--typing, general secretarial, accounting & computer, and office occupations--a large majority of teachers are female. Sex stereotyping of teachers in the office and nursing programs is more extreme in the ROC/ROPs than in high schools.

Segregation of Students by Sex

Sex stereotyping of students in office-related courses is also more extreme in the ROC/ROPs than in high schools, as shown in Table 5. This table also shows that most programs, in either high school or ROC/ROPs, are predominantly male or female, not mixed. Given the high degree of segregation by sex, is there any resulting disparity in resources for males and females? Table 5 indicates there is not, at least in teachers' salaries per daily student class hour. This was computed for male students by adding up the total expenditure for male class hours and dividing by the total number of male class hours. The total expenditure for male class hours is the sum over class periods of the males' fraction of the teacher's salary allocated to each class period.

For example, suppose there are 12 males and 8 females in an agriculture class for one period a day, and the annual expenditure for that class period is $3,500 (say, one-sixth of a full-time teacher's salary of $21,000). Then, since 60 percent of the students in the class are male, the annual expenditure for male class hours in that daily class period would be 60 percent of $3,500, or $2,100. This is added to the amounts computed from other classes to derive total expenditure for male class hours. That total is then divided by the total number of male daily class hours, to yield annual expenditure per daily student class hour for males.

Comparing the figures in Table 5 with those in Table 3 reveals that per-class-hour expenditure for males is generally very close to the expenditure for all students. In spite of the fact that vocational classes are highly segregated by sex, there is apparently no systematic sex disparity in expenditure on teachers' salaries per student class hour.

Handicapped, Disadvantaged, and LEP Students

Comparable figures for handicapped, educationally disadvantaged, and limited-English-proficient (LEP) students are presented in Table 6. Data on these students are subject to more error than data on males and females because the CBEDS Professional Assignment Form asks teachers to report actual numbers of males and females in each class, but for the

Table 5

Number of Daily Student Class Hours, and Expenditure on Teachers' Salaries Per Daily Student Class Hour, for Male Students in California Regional Occupational Programs (ROP) and Public High School (HS) Vocational Classes, by Instructional Program, October 1981

Program	Annual Expenditure on Teachers' Salaries per Daily Student Class Hr.			Daily Student Class-Hours			Male Student Class-Hours as a Proportion of Total	
	All Secondary	ROP	HS	All Secondary	ROP	HS	ROP	HS
1. Agriculture	188	209	181	42,378	10,379	31,999	.64	.69
2. Distrib. Ed.	172	168	181	9,400	6,061	3,339	.25	.41
3. Practical Nursing	313	245	341	681	195	486	.09	.37
4. Nurse's Aide	195	193	207	830	730	100	.08	.06
5. Child Care	164	156	168	1,824	603	1,221	.08	.07
6. Clothing	169	144	173	908	126	782	.09	.03
7. Food	177	202	168	20,536	5,661	14,876	.48	.33
8. Accounting & Computer	151	128	163	21,103	7,029	14,074	.28	.32
9. Office Occupations	172	180	171	9,379	1,038	8,341	.08	.21
10. General Secretarial	164	133	171	2,082	333	1,748	.05	.08
11. Typing	141	127	142	28,337	538	27,799	.07	.28
12. Auto Mechanics	176	175	177	73,550	20,096	53,455	.96	.94
13. Drafting	183	177	184	46,820	2,909	43,912	.79	.89
14. Machining & Metals	183	151	196	53,672	14,918	38,754	.98	.98
15. Construction	156	145	193	20,205	15,360	4,845	.94	.89
16. Wood	187	207	187	62,293	1,891	60,403	.95	.93
17. Other High Tech.	179	168	185	78,275	29,356	48,919	.70	.80
18. Other	153	130	170	54,363	23,092	31,270	.45	.42
Total	174	161	179	526,637	140,314	386,323	.51	.55

Source: C[illegible]DS

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Table 6

Number of Daily Student Class Hours, and Expenditure on Teachers' Salaries per Daily Student Class Hour, for Handicapped, Educationally Disadvantaged, and Limited English Proficient Students in California Regional Occupational Programs (ROP) and Public High School (HS) Vocational Classes, by Instructional Program, October 1981

Program	Handicapped						Educationally Disadvantaged						Limited English Proficient					
	Annual Expenditure on Teachers' Salaries per Daily Student Class-Hour			Daily Student Class-Hours			Annual Expenditure on Teachers' Salaries per Daily Student Class-Hour			Daily Student Class-Hours			Annual Expenditure on Teachers' Salaries per Daily Student Class-Hour			Daily Student Class-Hours		
	All Secondary	ROP	HS	All Secondary	ROP	HS	All Secondary	ROP	HS	All Secondary	ROP	HS	All Secondary	ROP	HS	All Secondary	ROP	HS
1. Agriculture	188	209	173	3,509	1,511	1,999	189	233	177	7,856	1,744	6,112	175	183	170	1,480	534	946
2. Distrib. Ed.	184	185	183	895	699	196	178	162	204	2,519	1,529	990	170	163	193	795	620	175
3. Practical Nursing	460	247	494	305	41	264	462	262	505	321	56	265	475	291	497	291	30	260
4. Nurse's Aide	254	257	205	236	223	13	194	186	217	964	716	248	193	189	206	365	281	84
5. Child Care	172	171	173	957	364	593	174	163	176	3,449	691	2,758	166	159	170	653	282	370
6. Clothing	183	129	185	1,045	28	1,017	183	220	182	3,939	107	3,832	182	183	181	2,335	373	1,961
7. Food	179	201	167	3,079	1,051	2,028	178	213	169	8,306	1,708	6,597	169	195	163	2,127	423	1,704
8. Accounting & Computer	153	130	168	1,190	471	719	159	157	160	4,101	773	3,328	147	120	165	2,069	801	1,267
9. Office Occupations	170	157	176	1,245	384	861	173	191	170	6,557	759	5,798	168	181	165	1,824	348	1,475
10. General Secretarial	190	164	206	352	133	219	190	178	194	1,753	435	1,318	162	137	184	905	419	486
11. Typing	146	170	144	2,299	228	2,071	149	244	146	12,284	453	11,831	142	157	141	6,691	465	6,226
12. Auto Mechanics	181	171	185	2,722	769	1,953	177	178	177	8,687	2,065	6,622	166	158	174	3,795	1,960	1,835
13. Drafting	176	118	193	1,405	331	1,074	187	180	187	4,099	129	3,970	169	122	181	2,189	458	1,731
14. Machining & Metals	181	141	197	2,399	676	1,723	196	171	202	7,085	1,433	5,652	156	130	195	3,980	2,410	1,569
15. Construction	205	191	265	1,081	875	206	217	223	207	1,803	1,120	683	125	112	166	610	457	153
16. Wood	188	220	187	3,071	91	2,981	192	222	191	9,098	269	8,828	186	214	185	2,188	39	2,149
17. Other High Tech.	172	160	187	4,118	2,297	1,822	185	191	182	9,191	3,190	6,001	160	146	180	5,451	3,246	2,205
18. Other	154	138	174	4,956	2,784	2,173	170	152	177	12,020	3,266	8,754	154	117	181	4,627	1,946	2,682
Total	177	168	182	34,867	12,954	21,912	179	186	177	104,033	20,445	83,588	162	145	172	42,376	15,095	27,280

Source: CBEDS

other categories of students it asks only approximate numbers: none, 1-4, 4-9, 10-20, or more than 20. In Table 6 and other analyses here, the midpoints of these intervals have been used as estimates of the actual numbers. Another source of greater error is in determining whether students should be classified as handicapped, educationally disadvantaged, or limited English proficient. If students have been formally identified for purposes of categorical programs, teachers must remember how many. Otherwise they just have to use their own judgment.

With these cautions in mind, Table 6 does show some patterns. Comparing the numbers of student class hour with the total in Table 3 reveals that handicapped students account for 3.5 percent, educationally disadvantaged 10.6 percent, and limited English proficient 4.3 percent of all daily student class hours. Some students may be in more than one category, so the total fraction of all class hours accounted for by these identified students is something less than 18.4 percent. ROC/ROPs have a lower fraction of educationally disadvantaged student class hours than high schools, but this is almost entirely offset by somewhat higher percentages of handicapped and limited English proficient students in ROC/ROPs.

Handicapped, educationally disadvantaged, and limited-English-proficient students are all under-represented in distributive education, accounting & computer, general secretarial, and drafting programs. These are programs directed toward jobs in offices and retail enterprises where verbal and face-to-face communications are relatively important. In contrast, the agriculture, machining and metals, food, and wood programs enroll disproportionately large numbers of the handicapped and educationally disadvantaged.

On the whole, Table 6 shows expenditure on teachers' salaries per daily student class hour is somewhat higher than average for handicapped and educationally disadvantaged students. But it is lower than average for students with limited English proficiency, especially in ROC/ROPs.

Table 7 shows the ratio of ROC/ROP to high school expenditures on teachers' salaries per daily student class hour in each instructional program and for each category of student. Differences in relative expenditures between categories of students are generally consistent across instructional programs. In most instructional programs, ROC/ROPs spend relatively more on educationally disadvantaged students, but less on the handicapped and those with limited English proficiency. The reason for these differences is not apparent.

Explaining Variation in Teachers' Salaries per Student Class Hour

To gain a better understanding of expenditure differences, regression analysis was used to measure the association between expenditures and several of these other variables. The unit of analysis in the regressions is an instructional program offered in a particular district or ROC/ROP. One such local program offering, for instance, is the agriculture program in

Table 7

Ratio of ROP to High School Annual Expenditure on Teachers' Salaries per Daily Student Class Hour, by Type of Student and Instructional Program, October 1981

	Program	All Students	Males	Educationally Disadvantaged	Handicapped	Limited English Proficient
1.	Agriculture	1.11	1.15	1.32	1.21	1.08
2.	Distrib. Ed.	.93	.93	.79	1.01	.84
3.	Practical Nursing	.55	.72	.52	.50	.59
4.	Nurse's Aide	.79	.93	.86	1.25	.92
5.	Child Care	1.01	.93	.93	.99	.94
6.	Clothing	.86	.83	1.21	.70	1.01
7.	Food	1.20	1.20	1.26	1.20	1.20
8.	Account and Computer	.74	.79	.98	.77	.73
9.	Office Occupations	1.02	1.05	1.12	.89	1.10
10.	General Secretarial	.93	.78	.92	.80	.74
11.	Typing	.99	.89	1.67	1.18	1.11
12.	Auto Mechanics	.98	.99	1.00	.92	.91
13.	Drafting	1.01	.96	.96	.61	.67
14.	Machining and Metals	.77	.77	.85	.72	.67
15.	Construction	.75	.75	1.08	.72	.67
16.	Wood	1.11	1.11	1.16	1.18	1.16
17.	Other High Tech.	.92	.91	1.05	.86	.81
18.	Other	.77	.76	.86	.79	.65
All Programs		.92	.90	1.05	.92	.84

Source: Tables 3, 5, 6.

district A, another is the distributive education program in district A, a third would be the agriculture program in district B, and so on. There were 3,974 such distinct local vocational programs in high schools in 1981, and another 746 in ROC/ROPs.

Table 8 shows the coefficients from three different regression equations for expenditure on teachers' salaries per daily student class hour. Each equation was run separately for high schools and ROC/ROPs. All regressions were run with data weighted by the number of student class hours in the local program.

Columns I and IV in Table 8 list the coefficients from the first equations, in which the only predictor was the type of instructional program. The coefficients here simply repeat the information from the second and third columns of Table 3. For instance, in ROC/ROPs, agriculture programs on average cost $70 a year more than "other programs" per daily student class hour. Distributive education programs cost $40 more, and so on. The numbers in columns I and IV are not always identical to those in the second and third columns of Table 3 because some local programs were excluded from the regressions in Table 8 due to missing data.

The first item of new information in Table 8 is that type of instructional program alone accounts for only 11 percent of the variance in expenditure by ROC/ROPs, 10 percent in high schools. So even though some of the average differences between types of instructional programs are substantial, there is almost as much variation in expenditure per class hour among local programs of the same type as there is between types.

When size of local programs, measured by number of daily student class hours, is added to the regression, results are as shown in columns II and V of Table 8. Now 30 percent of the variance among ROC/ROP programs is accounted for, but still only 12 percent in high schools. The coefficient on size is negative: a difference of 100 more student class hours per day translates into $0.77 less annual expenditure per daily student class hour in ROC/ROPs and $0.55 less in high schools. This is partly the result of spreading teachers' salaries over a larger number of student class hours.

The average local program in ROC/ROP occupied 371 student class hours a day, compared to 179 in high schools. Given the coefficient on size in Table 8, this difference of almost 200 daily student class hours accounts for a difference of about $1 to $1.50 in annual expenditure per class hour between high schools and ROC/ROPs, which is about one-tenth of the total difference shown in Table 3. Larger size therefore does account for some, but not most, of the difference in cost between ROC/ROP and high school programs.

Size accounts for a larger part of the differences among types of instructional programs in ROC/ROPs. Differences by type of instructional program in column II of Table 8 are typically less than half as big as in column I. Evidently a large part of the reason why some

Table 8

Regression Coefficients Describing Variation in Annual Expenditure on Teachers' Salaries per Daily Student Class Hour in California Regional Occupational Programs (ROP) and Public High School Vocational Classes, October 1981

(Numbers in parentheses are absolute values of coefficients divided by estimated standard errors.)

	ROP			High School		
	I	II	III	IV	V	VI
Difference from "other" instructional program:						
1. Agriculture	70(5.48)	25(2.09)	26(2.20)	14(3.41)	10(2.41)	13(3.25)
2. Distrib. Ed.	40(3.58)	-4(.36)	10(1.06)	21(2.67)	16(2.04)	17(2.22)
3. Practical Nursing	111(3.58)	66(2.38)	88(3.33)	144(7.66)	139(7.46)	163(9.05)
4. Nurse's Aide	49(3.08)	4(.27)	24(1.80)	59(3.67)	57(3.56)	65(4.23)
5. Child Care	45(2.60)	-3(.16)	7(.48)	5(.87)	1(.19)	6(1.05)
6. Clothing	26(.67)	-22(.63)	7(.21)	15(3.06)	11(2.29)	11(2.41)
7. Food	70(4.86)	24(1.83)	42(3.30)	0(.11)	-4(.94)	0(.14)
8. Accounting & Computer	-10(.90)	-25(2.54)	-18(1.91)	-5(1.27)	-6(1.41)	-12(3.06)
9. Office Occupations	47(3.32)	7(.58)	17(1.35)	4(.88)	3(.78)	0(.07)
10. General Secretarial	44(2.33)	-2(.13)	-4(.21)	20(3.87)	17(3.31)	13(2.59)
11. Typing	12(.65)	-25(1.52)	-13(.85)	-26(8.11)	-28(8.71)	-33(10.48)
12. Auto Mechanics	45(3.81)	6(.55)	15(1.41)	10(2.66)	9(2.54)	10(2.83)
13. Drafting	40(1.64)	-3(.15)	18(.87)	15(3.95)	15(3.83)	5(1.36)
14. Machining & Metals	19(1.44)	-8(.67)	8(.72)	27(6.48)	25(5.96)	21(5.25)
15. Construction	12(.97)	-6(.55)	12(1.13)	22(2.29)	17(1.77)	20(2.18)
16. Wood	79(2.40)	29(.99)	30(1.07)	19(5.25)	17(4.82)	13(3.81)
17. Other	40(4.16)	22(2.56	20(2.52)	16(4.32)	18(4.88)	16(4.39)
Base value for "other" program	131(20.91)	182(27.01)	180(13.59)	169(68.76)	175(69.95)	159(43.61)
No. daily student class hours		-.0077(13.52)	-.0049(6.51)		-.0055(10.01)	-.0036(5.44)
No. disadvantaged student class hours			.0397(1.68)			-.0019(.31)
Region: SF Bay			14(1.43)			-16(5.53)
Central Valley			-29(3.37)			-14(5.12)
LA/San Diego			-54(6.33)			-22(8.24)
Rest of state			-			-
Proportion teachers master's or more			28(1.98)			11(4.08)
Proportion teachers no bachelor's			-13(1.20)			2(.25)
Proportion teachers part time			29(3.29)			26(4.59)
Teacher mean years in district			1.7(1.91)			2.1(12.40)
R^2	.11	.30	.41	.10	.12	.18
N	723	723	723	3880	3880	3878

Source: CBEDS.

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types of instructional programs cost more than others in ROC/ROPs is that they average fewer student class hours. In high schools, the association between size and cost accounts for less of the difference among types of instructional program.

Finally, adding other features of local programs--region of the state, characteristics of teachers, and number of class hours attributed to educationally disadvantaged students--brings the proportion of variance explained up to .41 in ROC/ROPs and .18 in high schools. (The remaining variance is due to variation in class size, the number of classes taught per day, and the level of the salary schedule.) Coefficients are listed in columns III and VI of Table 8. More disadvantaged student class hours are associated with higher expenditure per class hour in ROC/ROPs, but not in high schools. (But recall that ROC/ROPs have proportionately fewer disadvantaged student class hours than high schools.) The Los Angeles/San Diego region has lower costs than other parts of the state. Reasons for these differences are not readily apparent.

Easier to understand are the differences in salary cost associated with teachers' characteristics. If a full-time teacher had 125 student class hours a day, and if the salary schedule paid $250 for each additional year of service in the district, then the average difference in annual salary per daily student class hour associated with an additional year of teacher's senority would be $2, which is about what Table 8 shows. Since ROC/ROP teachers on average have about seven years less seniority than high school teachers, this would account for virtually the whole $14 difference between high schools and ROC/ROPs in annual salary per daily student class hour. Likewise, the standard features of teachers' salary schedules explain the coefficients on proportions of teachers with master's or without bachelor's degrees. Since ROC/ROP teachers on average have fewer degrees than high school vocational teachers (see Table 4), these coefficients account for roughly $7 more of the difference between high schools and ROC/ROPs.

It would appear that we have accounted for more than the total actual difference in expenditure between high schools and ROC/ROPs--except that another factor, the proportion of part-time teachers, is much larger in ROC/ROPs (see Table 4). The coefficients in Table 8 imply that this difference *adds* about $7 a year per daily student class hour to ROC/ROPs compared to high schools. This roughly offsets the cost difference due to teachers' educational attainments.

But why should teachers' salaries per daily student class hour be higher in local programs where more of the teachers are part-time? One possible explanation is that some districts, as a cost-cutting measure, have encouraged teachers who are near retirement to take partial retirement, that is, working part-time while drawing some retirement benefits. Since these teachers would be at or near the top of the salary ladder, such part-time teachers would tend to raise the average salary per student class hour. This practice may also be more common in districts where enrollment has declined especially fast; partial retirement for older teachers is an alternative to laying off younger teachers. Since declining

enrollment increases cost per class hour by reducing the number of class hours, this may further explain why part-time teachers are associated with higher cost per class hour. In this scenario, higher cost per student class hour *causes* districts to put more teachers on part-time.

An alternative explanation is that districts hire more part-time teachers when strong local demand for certain skills makes it hard to find people who have those skills and who want to teach full time. Local program administrators then not only must accept a part-time commitment but also must arrange to have these teachers placed high up on the salary ladder--perhaps by counting years worked in the trade as years of previous teaching experience. This could create a positive correlation between part-time teachers and salary per class hour.

With the evidence at hand, neither of these explanations can be ruled out. But two considerations make the second somewhat more plausible. One is that the second explanation more readily accounts for the difference between ROC/ROPs and high schools. It seems more likely that ROC/ROPs hire more part-time teachers because they are teaching skills for which there is high demand than that they are relying more than high schools on partial retirement as a cost-cutting measure. Second, the high-demand explanation is also consistent with the findings reported in Section IV: that students who have been in programs with part-time teachers are themselves more likely to find early success in the labor market.

Summary

Students spend nearly one million hours a day in vocational classes offered by California public high schools and ROC/ROPs (regional programs). They spend more than twice as much time in high school vocational classes as in ROC/ROPs. Typing, drafting, clothing, and wood shop are taught mainly in high schools; ROC/ROPs offer most of the instruction in nursing, retailing, and construction. However, most vocational programs are offered in both places, though possibly at a more advanced level in ROC/ROPs.

Comparing instructors in the same subject, the average full-time teacher's salary is greater in high schools ($23,625) than in ROC/ROPs ($17,540), in part because high school teachers have more advanced degrees and more years of experience as teachers. However, ROC/ROP teachers apparently have more experience outside teaching, and more of them currently teach only part-time.

Students in ROC/ROPs have more access to teachers. The average full-time teacher in ROC/ROPs is responsible for only 109 student class hours per day, compared to 135 in high school vocational programs. Despite this difference, ROC/ROPs keep annual teachers' salaries per daily student class hour at $160, which is below the $174 average in

high school vocational programs. Lower salaries per full-time teacher are what keep salary costs per student class hour lower in ROC/ROPs. In both high schools and ROC/ROPs, programs that enroll more students, or that occupy each student for more hours each day, tend to have lower salary costs per daily student class hour.

Vocational programs remain highly segregated by sex in both high schools and ROC/ROPs. However, there appear to be no systematic differences between predominantly male and predominantly female programs in the annual amount spent on teachers' salaries per daily student class hour.

IV. Outcomes of Vocational Education in California Public High Schools

High Unemployment Among Recent Vocational Graduates

Since spring 1981 the California State Department of Education has conducted an annual survey of students who were enrolled in high school vocational programs during the previous school year. The survey is called FUSE: Follow-Up of Students and Employers. Each year it includes districts enrolling about one-fourth of the vocational students in the state. In spring 1982, questionnaires were mailed to 20, 035 students who had been in high school--not ROC/ROP--vocational programs the year before. Of the 12,304 students who returned questionnaires, 59 percent reported that they were employed. The unemployment rate (the number of unemployed divided by the sum of the number employed and the number unemployed among those who returned questionnaires was 26 percent.

About 70 percent of the 1982 FUSE sample had been high school seniors during the 1981-82 school year, and about 30 percent had been juniors. By the time of the survey in spring 1982, most would have been near their 19th birthday. In comparison, employment and unemployment among the whole California population are reported separately for 16 through 19 year-olds. In this somewhat younger comparison group, unpublished data from the California Employment Development Department show that 39 percent of the population was employed during the FUSE survey months of February through April 1982. The unemployment rate among the 16 through 19 year-olds statewide was 23 percent.

These numbers imply that the former high school vocational students are much more likely to be in the labor force than are 16-19 year-olds statewide. The labor force participation rate (sum of employed and unemployed, divided by population) was almost 80 percent for the FUSE respondents and only 53 percent for all 16-19 year-olds in the state. This is understandable since most of the state's 16-19 year-olds would still be full-time students in high school, while most of the FUSE respondents would have graduated. What is not so readily understandable is that FUSE respondents appear to be somewhat less successful when they enter the labor market--their unemployment rate is three points *higher*.

Both the higher rate of labor force participation and the higher rate of unemployment of FUSE students may be attributable to lower socio-economic backgrounds and lower academic achievement. National studies have consistently shown that vocational students on average come from families with lower socio-economic status, and score lower on achievement tests, than other high school students (Oakes, 1983; Meyer, 1981b). Differences in socio-economic background are especially pronounced when the comparison

involves students who concentrate intensively on a vocational program, rather than including all students who enroll in vocational classes (Campbell and others, 1981). Only a few students in high school vocational classes are taking a serious, concentrated program including advanced specialized courses which impart entry-level skills in a specific occupation or well-defined group of related occupations. These are the stringent criteria by which districts in the FUSE sample were instructed to select students (FUSE Operations Handbook, 1981). Accordingly, students selected for FUSE accounted for only about 15 to 20 percent of student class hours in vocational programs in sample districts during 1981-82. Although FUSE did not compile or collect data on these students' socio-economic backgrounds or academic achievement, it is likely that these are both lower than average.

Comparing FUSE respondents' experiences in the labor market with that of all 16-19 year-olds in the state, without controlling for socio-economic status and academic achievement, therefore, may not give an accurate measure of what vocational education accomplishes. Without vocational education, would these students' experiences have been even worse?

Data on high school dropouts shed some light on this question. Like vocational students, dropouts tend to come from families with low socio-economic status, and tend to score low on achievement tests. If vocational education is effective, then students who concentrate in a vocational program should do better in the labor market than high school dropouts. In fact, however, data on California high school dropouts from the same year show no advantage for vocational students.

The data on dropouts come from the national High School and Beyond (HS&B) survey (Jones and others, 1983). The California part of the HS&B sample included 2,863 sophomores in spring 1980, of whom 231 were not enrolled in high school and had not graduated two years later. Using the appropriate sampling weights gives an estimated two-year dropout rate of 16.8 percent among this cohort of California sophomores. The proportion of students who had already taken at least a year of courses in a vocational program by the end of sophomore year was the same--about one-third--among those who later did and did not drop out.

The 1982 HS&B follow-up asked dropouts what they had been doing the first week of February 1982. Seventy-one percent indicated they were in the labor force, either "working for pay at a full-time or part-time job" or "looking for work." Of those in the labor force, 27 percent were unemployed, i.e., looking for work (Stern and others, 1985). This compares with the 59 percent labor force participation rate and 26 percent unemployment rate for FUSE respondents.

On the face of it, high school juniors and seniors who had taken advanced, specialized vocational courses in 1981-82 were somewhat less likely to be active in the labor force in 1982 than were 1980 sophomores who had dropped out of high school. Among those in

the labor force, the unemployment rate was virtually the same. Although dropouts cannot be considered a control group in the strict, experimental sense, they generally do resemble vocational students in low socio-economic background and low academic achievement. The comparison, therefore, makes it plain that concentrating in high school vocational education does not give such students any sure route to quick success in the labor market.

If data for dropouts and vocational students had been collected in exactly the same way and at exactly the same time, the comparison probably would have looked even worse for the vocational students. In order to be counted as unemployed, they had to affirm that they were "actively" seeking employment, while the HS&B questionnaire asked dropouts only if they were looking for work, which could mean just waiting passively and hoping for a job to turn up. The narrower FUSE definition would produce a lower unemployement rate. Similarly, the timing of the two questionnaires probably produced a lower unemployment rate for FUSE respondents. They were asked their "current" employment status at the time they filled out questionnaires--in February, March, or April 1982. But the HS&B questionnaire referred specifically to the first week of February 1982; in California the unemployment rate for 16-19 year-olds was lower in March and April (21 and 22 percent) than in February, (25 percent), according to unpublished figures from the Employment Development Department.

Finally, both surveys were affected by some response bias. Blacks and Hispanics were under-represented, and whites were over-represented, among dropouts in the 1982 HS&B follow-up. Similarly, former students who returned the FUSE questionnaire included larger proportions of whites and Asians, and smaller proportions of Hispanics and program leavers, than the whole sample of former students who were selected by the districts. The unemployment rates computed from both surveys are therefore likely to be lower than the true rates. Whether the bias is worse for one survey than the other is unknown. However, it is not likely that any difference due to response bias would alter the conclusion. High school students specializing in vocational education started out no better in the labor market than high school dropouts.

Variation in Labor Market Outcomes by District and Instructional Program: Does Anything Work Consistently?

Given this evident lack of any positive overall effect on students' early experience in the labor market, are there nevertheless some particular programs or districts where vocational students do get off to a good start? If so, are there any characteristics that successful local programs share? To answer these questions, 1981-82 FUSE data were merged with 1981 CBEDS data. Information about students from each instructional program in each FUSE sample district was combined with information about teachers who taught that program in 1981-82, when the FUSE students were enrolled. The unit of observation in this merged file is the local instructional program; for instance, the typing program in district A as opposed to the agriculture program in district A or the typing program in district B. The

file contains 473 such local programs, located in 83 secondary or unified districts. Since the file is based on FUSE, it contains no data on ROC/ROPs.

Table 9 displays data on students from these 473 local programs. Proportions are weighted by number of students in the local program. The mean number of students in local programs exceeds the median in all but one instructional area, indicating that in all but one area there are a few local programs that are much bigger than the rest.

The biggest differences among instructional areas are in the proportion of female students. Females are concentrated in programs related to health, home economics, and office occupations. Males predominate in the "trades and industry" group. The proportion of females in male-dominated areas is bigger than the proportion of males in female-dominated fields. This is exactly the same pattern of segregation by sex that is evident in data for the whole state (Tables 4 and 5).

There is not a strong correlation across instructional areas between the sex and ethnic composition of students. Asians are somewhat concentrated in fields that are integrated by sex. Relatively high proportions of blacks and Hispanics can be found in some male-dominated and some female-dominated fields, for example, drafting, wood, and clothing. But other fields that are segregated by sex have relatively low proportions of blacks and Hispanics, for instance, construction and general secretarial courses. Except for the very small program to train nurse's aides, no instructional area as a whole is less than 50 percent white.

Table 9 also shows some variation across instructional areas in the proportion of students who were seniors at the time they were enrolled in the program in 1981. Almost all students who were not in grade 12 were in grade 11, though there were a few adults (over age 18). There are some small differences among programs in the proportion of students who completed the program. Most 1981 seniors would have graduated from high school by 1982 whether or not they completed their vocational program. Most 1981 juniors would still be in high school in 1982 whether or not they had completed their program of vocational courses.

Table 9 shows the median number of hours in each instructional program. They range from one year (at one hour a day for 180 days) to two years.

These differences might be expected to result in different degrees of success among students from different programs. Table 10 shows outcomes by program. Means and proportions are weighted by number of students in the local program. The proportions currently employed and currently in school are computed from the whole group of students in the FUSE sample, whether or not they returned the 1982 follow-up questionnaire. The proportion who did not return questionnaires is shown in the third column of Table 10. Overall, the nonresponse rate was 39 percent.

Table 9

Characteristics of Selected Students in Vocational Programs in Selected California Public High Schools, by Instructional Program, 1981

Program	No. of districts with program	Mean no. of students per district in each program	Median no. of students per district in each program	Proportion Asian or Pac. Islander (excl. Filipino)	Proportion black (not Hispanic)	Proportion Hispanic	Proportion white (not Hispanic)	Proportion handicapped	Proportion female	Proportion grade 12	Proportion completers	Median contact hours of instruction
1. Agriculture	39	13	11	.01	.01	.11	.84	.10	.40	.39	.89	360
2. Distrib. Ed.	16	21	18	.06	.06	.16	.70	.05	.63	.76	.88	270
4. Nurse's Aide	3	64	84	.02	.84	.07	.07	.70	.94	.54	.98	374
5. Child Care	10	31	21	.01	.09	.37	.52	.20	.95	.74	.97	181
6. Clothing	6	37	32	.02	.17	.23	.57	.12	.98	.77	.91	265
7. Food	8	34	29	.02	.08	.27	.59	.16	.56	.75	.83	239
8. Accounting & Computer	53	47	23	.06	.04	.10	.76	.09	.65	.68	.88	225
9. Office Occups.	57	66	29	.04	.07	.18	.69	.13	.77	.71	.86	296
10. Gen. Secretarial	53	34	23	.05	.05	.13	.74	.08	.96	.71	.87	348
11. Typing	57	50	20	.05	.04	.13	.74	.08	.80	.63	.83	270
12. Auto Mechanics	29	53	31	.03	.05	.14	.76	.10	.04	.74	.89	360
13. Drafting	20	32	20	.04	.09	.23	.61	.15	.09	.66	.92	350
14. Machining & Metals	24	20	13	.03	.07	.22	.65	.16	.02	.71	.91	350
15. Construction	5	15	13	.03	.01	.18	.78	.03	.03	.66	.84	303
16. Wood	15	20	16	.02	.08	.27	.60	.10	.10	.74	.87	346
17. Other High Tech.	29	37	27	.05	.15	.17	.59	.13	.31	.79	.91	214
18. Other	49	30	14	.02	.12	.17	.66	.18	.40	.62	.91	357
All programs	83	39	20	.04	.08	.16	.70	.12	.59	.69	.88	325

Source: Follow Up of Students and Employers

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Table 10

First-Year Follow-up Data on Selected Students from Vocational Programs in Selected California Public High Schools, by 1981 Instructional Program, Spring 1982

Program	Proportion currently in school	Proportion of whole sample employed (incl. military)	Proportion unknown employment status	Unemployment rate	Mean hrs/wk for those employed	Expected hourly wage (employment rate X mean wage)	Proportion of employed who say job is related to training
1. Agriculture	.37	.33	.44	.19	31	$3.29	.34
2. Distrib. Ed.	.38	.41	.38	.24	31	3.21	.46
4. Nurse's Aide	.53	.20	.30	.60	33	1.65	.52
5. Child Care	.28	.27	.46	.33	32	2.55	.25
6. Clothing	.36	.39	.36	.22	27	3.22	.27
7. Food	.27	.33	.45	.24	29	2.98	.35
8. Accounting & Computer	.50	.41	.31	.23	27	2.99	.27
9. Office Occupations	.35	.33	.42	.29	29	2.77	.40
10. General Secretarial	.43	.45	.33	.21	28	3.24	.43
11. Typing	.42	.35	.38	.27	27	2.69	.29
12. Auto Mechanics	.29	.35	.46	.24	33	3.42	.33
13. Drafting	.46	.34	.35	.31	30	2.96	.20
14. Machining & Metals	.28	.41	.38	.22	34	3.62	.37
15. Construction	.26	.33	.47	.25	35	3.15	.25
16. Wood	.26	.34	.44	.30	34	3.09	.19
17. Other High Tech	.39	.35	.37	.24	30	3.19	.26
18. Other	.32	.36	.42	.24	32	3.21	.35
All programs	.38	.36	.39	.26	30	3.00	.33

Source: FUSE

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Unemployment rates in Table 10 are computed in the conventional way: among those who returned questionnaires, the unemployment rate is the number seeking work divided by the sum of those employed and those seeking work. The expected hourly wage, for those in the labor force, is the probability of having a job, multiplied by the average wage of those who have jobs. The probability of having a job is the proportion of the labor force who are employed, i.e., one minus the unemployment rate.

Finally, Table 10 shows the proportion of employed respondents who said their present jobs were "directly or closely related" to their field of vocational training.

Table 10 shows that these outcomes definitely do differ among instructional programs, and some programs appear to have consistently better outcomes. Former students from agriculture, accounting and computer, general secretarial, and machining & metals reported relatively positive outcomes on the whole, while former students from nurse's aide and child care training were doing poorly. But Table 9 shows that three of the four relatively successful programs all have smaller than average proportions of black and Hispanic students (the exception is machining & metals), while the two programs with especially poor outcomes both have larger than average proportions of Hispanics or blacks.

Residential segregation and discrimination in labor markets continue to put black and Hispanic youth at a disadvantage, apart from what schools do. It would be important to know whether schools mitigate or exacerbate the disadvantage. If the enrollment pattern of Hispanics and blacks were changed, would these students achieve more or less early success in the labor market? Unfortunately, existing data cannot answer this question definitively. Without some actual experimentation, there is no way to be sure whether black and Hispanic students are systematically placed in poorer programs, whether they are actually enrolled in relatively good programs but still do worse because of residential segregation and discrimination in labor markets, or whether the pattern of enrollment has no effect one way or the other.

Some suggestive evidence, however, can be obtained by regressions of the kind reported in Tables 11A-11C. (For these regressions, data were grouped by local program and weighted by the square root of the number of students in the local program, to correct for heteroskedasticity.) Former students from local programs where a large proportion of students were black reported high rates of unemployment, small proportions of all respondents employed, and lower expected wages compared to former students from local programs where a large proportion of students were white. A large proportion of Hispanic students were also associated with negative outcomes compared to local programs with large proportions of white--but the black-white difference is much more pronounced than the Hispanic-white difference.

Table 11A

Regression for First-Year Outcomes
(Numbers in Parentheses are Absolute Values of Coefficients Divided by Estimated Standard Errors)

	Unemployment Rate		Proportion of Whole Sample Employed	
	I	II	III	IV
Difference from "other" instructional program:				
1. Agriculture	.01 (.20)	-.01 (.37)	-.07 (1.63)	-.06 (1.59)
2. Distrib. Ed.	.04 (.73)	.02 (.42)	.08 (1.38)	.07 (1.32)
4. Nurse's Aide	.15 (1.76)	.14 (1.69)	-.04 (.46)	.01 (.17)
5. Child Care	.09 (1.70)	.09 (1.61)	-.08 (1.42)	-.08 (1.43)
6. Clothing	.01 (.23)	.01 (.16)	-.001 (.02)	.01 (.16)
7. Food	.05 (.80)	.03 (.53)	-.05 (.83)	-.05 (.80)
8. Accounting & Computer	.05 (1.62)	.05 (1.54)	-.01 (.21)	.00 (.04)
9. Office Occupations	.08 (2.73)	.07 (2.44)	-.04 (1.21)	-.03 (1.14)
10. General Secretarial	.02 (.63)	.01 (.42)	.05 (1.53)	.06 (1.78)
11. Typing	.07 (2.43)	.07 (2.36)	-.03 (1.10)	-.03 (1.11)
12. Auto Mechanics	.06 (1.75)	.05 (1.40)	-.02 (.58)	-.02 (.44)
13. Drafting	.08 (1.94)	.08 (2.00)	-.03 (.64)	-.02 (.51)
14. Machining & Metals	.02 (.39)	.01 (.33)	.04 (.90)	.06 (1.36)
15. Construction	.05 (.55)	.04 (.49)	-.07 (.86)	-.04 (.46)
16. Wood	.07 (1.33)	.06 (1.23)	-.01 (.11)	-.00 (.05)
17. Other High Tech.	.01 (.35)	.00 (.03)	-.02 (.52)	-.01 (.39)
Base value for "other" program	.50 (4.92)	.45 (4.50)	.27 (2.58)	.37 (3.58)
Proportion students black (not Hispanic)	.05 (.44)	.07 (.67)	-.24 (2.16)	-.24 (2.21)
Proportion students Hispanic	-.16 (1.50)	-.14 (1.37)	-.07 (.64)	-.07 (.62)
Proportion students white (not Hispanic)	-.25 (2.68)	-.25 (2.68)	.003 (.03)	.009 (.09)
No. disadvantaged student class hours	.0002 (1.71)	.0002 (1.77)	-.00009 (.65)	-.00004 (.30)
Region: SF Bay	.01 (.37)	.00 (.16)	.02 (.51)	.02 (.71)
Central Valley	.10 (3.50)	.09 (3.27)	-.05 (1.65)	-.05 (1.84)
LA/San Diego	.00 (.06)	.00 (.03)	-.01 (.40)	-.01 (.41)
Rest of state	-	-	-	-
Proportion students grade 12	-.13 (4.42)	-.13 (4.22)	.06 (2.04)	.06 (2.04)
No. contact hours in local program	-.00003 (.93)	-.00003 (.76)	.0001 (2.69)	.00008 (2.26)
Proportion teachers with master's or more	-.01 (.39)	-	-.04 (1.70)	-
Proportion teachers without bachelor's	.04 (.53)	-	.08 (1.13)	-
Proportion teachers part time	-.11 (3.04)	-	-.03 (.67)	-
Teacher mean years in district	.002 (1.11)	-	.0002 (.15)	-
Mean full-time teacher's salary	-.000002 (1.00)	-	.000004 (1.97)	-
Annual expenditure on teachers' salaries per daily student class hr.	-	.00008 (.77)	-	-.0001 (.99)
Proportion of employed who say job related to training, minus proportion not				
R^2	.32	.30	.21	.20
N	428	427	444	443

Source: Follow Up of Students and Employers
California Basic Educational Data System

Table 11B

Regressions for First-Year Outcomes
(Cont'd.)

	Proportion of Employed Who Say Job Related to Training, Minus Proportion Not		Proportion Currently in School	
	I	II	III	IV
Difference from "Other" instructional program:				
1. Agriculture	-.12 (1.14)	-.12 (1.08)	.06 (1.54)	.05 (1.28)
2. Distrib. Ed.	.26 (1.72)	.25 (1.67)	.07 (1.20)	.06 (.97)
4. Nurse's Aide	.00 (.00)	.10 (.43)	.20 (2.21)	.24 (2.76)
5. Child Care	-.21 (1.41)	-.21 (1.39)	.01 (.18)	.01 (.11)
6. Clothing	-.28 (1.54)	-.24 (1.33)	.02 (.30)	.02 (.34)
7. Food	.11 (.66)	.14 (.82)	-.04 (.64)	-.05 (.85)
8. Accounting & Computer	-.14 (1.59)	-.16 (1.88)	.13 (4.07)	.14 (4.32)
9. Office Occupations	.10 (1.22)	.07 (.83)	.04 (1.21)	.04 (1.24)
10. General Secretarial	.07 (.82)	.07 (.81)	.09 (2.80)	.09 (2.76)
11. Typing	-.11 (1.33)	-.14 (1.66)	.08 (2.44)	.08 (2.44)
12. Auto Mechanics	-.02 (.16)	-.01 (.13)	-.01 (.29)	-.01 (.36)
13. Drafting	-.36 (3.13)	-.38 (3.28)	.12 (2.87)	.13 (3.03)
14. Machining & Metals	.05 (.38)	.09 (.73)	-.05 (1.09)	-.03 (.77)
15. Construction	-.37 (1.60)	-.32 (1.40)	-.10 (1.13)	-.07 (.80)
16. Wood	-.30 (2.20)	-.31 (2.22)	-.06 (1.08)	-.05 (1.00)
17. Other High Tech	-.24 (2.37)	-.24 (2.35)	.11 (2.87)	.11 (2.83)
Base value for "other" program	-.43 (1.55)	-.42 (1.53)	.39 (3.75)	.46 (4.43)
Proportion students black (not Hispanic)	.23 (.78)	.27 (.90)	-.14 (1.24)	-.13 (1.20)
Proportion students Hispanic	.05 (.19)	.11 (.37)	-.10 (.91)	-.10 (.92)
Proportion students white (not Hispanic)	.10 (.38)	.10 (.38)	-.04 (.43)	-.04 (.46)
No. disadvantaged student class hours	-.00007 (.19)	-.00006 (.16)	-.00004 (.27)	.00001 (.07)
Region: SF Bay	.11 (1.43)	.07 (.95)	.07 (2.46)	.08 (2.70)
Central Valley	.21 (2.74)	.19 (2.45)	.00 (.02)	-.01 (.28)
LA/San Diego	.16 (1.99)	.09 (1.16)	.03 (.92)	.04 (1.28)
Rest of state	-	-	-	-
Proportion students grade 12	.01 (.15)	.005 (.06)	-.14 (4.65)	-.14 (4.55)
No. contact hours in local program	.0002 (2.42)	.0002 (2.03)	.00 (.19)	.00 (.12)
Proportion teachers with master's or more	-.18 (2.88)	-	-.02 (.67)	-
Proportion teachers without bachelor's	.13 (.69)	-	.11 (1.45)	-
Proportion teachers part time	.08 (.81)	-	-.11 (3.00)	-
Teacher mean years in district	.00007 (.02)	-	.009 (.58)	-
Mean full-time teacher's salary	-.00 (.03)	-	.000002 (1.17)	-
Annual expenditure on teachers' salaries per daily student class hour	-	-.0001 (.39)	-	-.00006 (.54)
Proportion of employed who say job related to training, minus proportion not	-	-	-	-
R^2	.19	.16	.25	.23
N	425	424	444	443

Source: Follow Up of Students and Employers
California Basic Educational Data System

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Table 11C

Regressions for First-Year Outcomes
(Cont'd.)

	Expected Hourly Wage		
	I	II	III
Difference from "other" instructional program:			
1. Agriculture	-.20 (.89)	-.08 (.37)	-.17 (.76)
2. Distrib. Ed.	-.25 (.82)	-.17 (.54)	-.35 (1.14)
4. Nurse's Aide	-.72 (1.49)	-.63 (1.36)	-.72 (1.52)
5. Child Care	-.85 (2.74)	-.81 (2.62)	-.78 (2.54)
6. Clothing	-.38 (.97)	-.34 (.86)	-.31 (.80)
7. Food	-.68 (1.99)	-.59 (1.73)	-.73 (2.16)
8. Accounting & Computer	-.64 (3.54)	-.61 (3.43)	-.58 (3.28)
9. Office Occupations	-.71 (4.22)	-.66 (3.95)	-.75 (4.52)
10. General Secretarial	-.40 (2.20)	-.37 (2.00)	-.43 (2.40)
11. Typing	-.76 (4.43)	-.74 (4.36)	-.72 (4.25)
12. Auto Mechanics	-.18 (.91)	-.12 (.61)	-.18 (.92)
13. Drafting	-.44 (1.88)	-.45 (1.92)	-.31 (1.34)
14. Machining & Metals	.11 (.46)	.13 (.55)	.08 (.35)
15. Construction	-.44 (.95)	-.39 (.85)	-.31 (.67)
16. Wood	-.22 (.76)	-.20 (.67)	-.10 (.34)
17. Other High Tech	-.18 (.89)	-.12 (.60)	-.09 (.46)
Base value for "other" program	1.56 (2.75)	1.92 (3.43)	1.71 (3.05)
Proportion students black (not Hispanic)	-.28 (.47)	-.45 (.75)	-.35 (.59)
Proportion students Hispanic	.75 (1.27)	.66 (1.12)	.77 (1.32)
Proportion students white (not Hispanic)	1.03 (1.97)	1.04 (1.98)	1.01 (1.96)
No. disadvantaged student class hours	-.0017 (2.27)	-.0017 (2.22)	-.0017 (2.29)
Region: SF Bay	.29 (1.76)	.33 (2.08)	.24 (1.49)
Central Valley	-.33 (2.06)	-.31 (1.97)	-.41 (2.59)
LA/San Diego	.24 (1.47)	.25 (1.66)	.18 (1.11)
Rest of state	-	-	-
Proportion students grade 12	.98 (5.87)	.95 (5.68)	.96 (5.86)
No. contact hours in local program	.0003 (1.62)	.0003 (1.52)	.0002 (1.19)
Proportion teachers with master's or more	.02 (.14)	-	.08 (.65)
Proportion teachers without bachelor's	-.22 (.55)	-	-.27 (.70)
Proportion teachers part time	.50 (2.34)	-	.47 (2.24)
Teacher mean years in district	-.011 (1.26)	-	-.011 (1.22)
Mean full-time teachers' salary	.00002 (1.55)	-	.00002 (1.58)
Annual expenditure on teachers' salaries per daily student class hour		-.0004 (.74)	-
Proportion of employed who say job related to training, minus proportion not	-	-	.38 (3.64)
R^2	.35	.33	.37
N	416	415	416

Source: Follow Up of Students and Employers
California Basic Educational Data System

When these racial-ethnic proportions and the other variables listed on the left side of Tables 11A-11C are statistically controlled, the instructional programs that appear relatively effective or ineffective are not the same as in Table 10. Students from agriculture programs still appear to do relatively well in the labor market, as do students from machining & metals. Now, in addition, the "other high tech" and "other" programs are also associated with relatively good labor market results. Students from the child care program again appear to do especially poorly. But now accounting & computer programs seem also to be associated with generally unfavorable labor market outcomes, as do office occupations, typing, and drafting.

The four relatively successful programs together include a larger proportion of males than the five relatively unsuccessful programs, but not all instructional programs in the relatively successful group are predominantly male, and not all of the relatively unsuccessful programs are predominantly female. (Because sex composition is so highly correlated with instructional program, it was not included as a separate variable in the regressions.) There is virtually no difference between the group of four relatively successful and the group of five relatively unsuccessful programs in the proportion of black or Hispanic students.

These results suggest that the existing distribution of males and females among instructional programs may be helping males, but the enrollment pattern by race or ethnicity appears neutral in its effect on early labor market outcomes. However, this finding is only suggestive because the coefficients in Tables 11A-11C were estimated for the existing enrollment pattern, and if the enrollment pattern changed, the estimated coefficients might change too.

Some definite variation by region of the state is apparent in Tables 11A-11C. Students in the Central Valley experienced a relatively high unemployment rate and obtained relatively low expected wages. (The Central Valley here was defined as the counties of Amador, Calaveras, Colusa, Fresno, Kern, Kings, Madera, Riverside, Sacramento, San Bernardino, San Joaquin, Tulare, and Tuolomne. The San Francisco Bay region included Alameda, Marin, Napa, San Mateo, Santa Clara, Solano, and Sonoma counties. Los Angeles, Orange, San Diego, and Ventura counties made up the Los Angeles-San Diego region. The rest of the state consisted of Butte, Imperial, Lake, Santa Barbara, Santa Cruz, Shasta, Siskiyou, and Trinity counties. Not all counties in the state were included in the FUSE sample.)

Students from local programs with larger proportions of seniors did generally better in the labor market. They were also less likely to be still enrolled in school during the follow-up year. These are not surprising results.

Also not surprising--and possibly reassuring--are the coefficients on contact hours. Students from local programs with more contact hours of instruction were more likely to

report that their jobs were related to their training. They also reported somewhat lower unemployment rates and higher expected wages, but these coefficients are small relative to their estimated standard errors.

In one regression, reported in column III of Table 11C, the proportion who said their jobs were related to their training was included as a predictor of expected wage, and the coefficient was positive. This is consistent with findings by Rumberger and Daymont (1982). The immediate payoff from high school vocational education is greater for students who find jobs related to their training. But as Table 8 showed, only one of three employed respondents from the FUSE survey did have such jobs.

Finally, Tables 11A-11C include several measures of teachers' characteristics from CBEDS. Only one of these, the proportion of teachers who are part-time, is strongly associated with first-year outcomes. Students from local programs with more part-time teachers report lower unemployment rates and higher expected wages. They are also less likely to be continuing in school. One possible reason for this pattern is that many part-time teachers are spending the rest of their time in the occupations they teach, so they are more effective in steering students into those occupations. However, the coefficient on part-time teachers in column I of Table 11B does not indicate a strong association with placement related to training. Another possible explanation, as mentioned in the section on salaries, is that administrators hire more part-time teachers when generally strong demand in the local labor market makes it difficult to recruit and retain full-time teachers. The same generally strong demand would also produce the relatively positive outcomes for students, even if they found jobs outside their field of training.

Other characteristics of teachers are not strongly associated with first-year outcomes. Tables 11A-11C show coefficients on teacher characteristics that are small relative to their standard errors. When expenditure on teachers' salaries per daily student class hour, which depends on class size as well as teachers' salaries, is used instead of the teachers' characteristics, the coefficients are again small relative to their standard errors. It is possible that some errors occurred in merging these CBEDS data with the FUSE data, since teachers may not have written assignment codes on their CBEDS forms that would match them with the right students from FUSE. Whether for this reason or because there really is no strong relationship between expenditures and outcomes, the evidence at hand does not reveal that money for vocational education is being spent in a way that maximizes students' early success in the labor market.

Dropout Prevention

In California, data from the High School and Beyond survey (Jones and others, 1983) can be used to test whether students who take more vocational classes are less likely to drop out. One test, which controls for sophomores' self-reported expectation of graduating from high school, is reported in Table 12. Students who, as sophomores, did not clearly

Table 12

Percentage of 1980 California Sophomores Who Had Dropped Out in 1982, by Number of Vocational Courses Taken Through Grade 10 and Whether in 1980 They Expected to Graduate
(Percentages are based on sample sizes in parentheses, but computed from data weighted by sampling weights)

Combined years of course work in business, trade, technical, or other vocational subjects by end of grade 10	Do you expect to graduate from high school?	
	yes	maybe or no
none	10.4% (668)	29.0% (53)
1/2 or 1 year	6.5% (660)	48.6% (49)
1 1/2 years or more	7.2% (385)	50.0% (44)

Source: High School and Beyond data

affirm that they expected to graduate from high school were, in fact, more likely to have dropped out two years later. This is clear from comparing the two columns of Table 12. Among sophomores who expected to graduate, those who had taken more vocational classes by the end of 10th grade were less likely to drop out. But among sophomores who did not expect to graduate or were not sure, those who had taken more vocational classes were *more* likely to drop out. Apparently, in this sample, vocational classes may have kept some students interested in high school, but students who were already thinking of dropping out when they were sophomores did not become more motivated to stay in school by having taken more vocational classes. (Further analysis of vocational education and dropouts in California is in Stern and others, 1985.)

We must repeat that nonrandom selection of students into vocational education makes it difficult to measure the effect of vocational classes on dropping out. Students may be selected into vocational classes for reasons that also make them more--or less--likely to drop out. Nevertheless, it seems safe to conclude that, while some students find vocational classes more interesting than other classes and are more likely to remain in high school because those classes are offered, vocational education is not generally effective in retaining California high school students who are most prone to drop out.

Summary

California high school students who concentrated in vocational subjects during 1981 had a 26 percent unemployment rate in spring 1982. In that same spring, the unemployment rate for all 16 to 19 year-olds in the state was 23 percent. Also that spring, a sample of California dropouts from the high school class of 1982 had an unemployment rate of 27 percent. Evidently, high school vocational training did not give students any relative advantage in finding jobs after they graduated.

Available evidence also did not reveal that vocational classes are effective in retaining students who have doubts about finishing high school.

Controlling for geographic location and for racial or ethnic composition of students, vocational programs in agriculture, metal work, and certain other subjects do appear relatively successful in improving graduates' prospects for employment and earnings. Generally, earnings tended to be higher if graduates found employment related to their training.

Measured characteristics of vocational teachers were generally not related to labor market outcomes for recent graduates. The only exception is that graduates from programs with more part-time teachers did better in the labor market. The reason may be that programs in high-demand areas have more success placing graduates and also more difficulty hiring full-time teachers.

On the whole, vocational classes as currently offered in California comprehensive high schools are not demonstrably effective in helping students find jobs after they graduate, or in retaining would-be dropouts. Furthermore, there is no evident way in which reallocating resources among existing high school vocational programs would bring about much improvement in labor market outcomes for graduates. How high school vocational education might be reconstituted in a more fundamental way is the subject of the next section.

V. Reconstituting Vocational Education in California Public Secondary Schools

Education and Work: Why Are They Separated?

A major paradox underlies high school vocational education. Schools are supposed to help prepare students for work, yet they are designed to keep students out of the job market. Vocational and other classes give students "school work," but virtually no chance to produce anything of use or value to someone other than themselves. Of course, what they learn from school work should be useful or valuable to students themselves, at least in the future. But the enforced self-centeredness of the student role bothers some teenagers, like the high school junior quoted in the Boyer (1983) report who said her classes were

> pretty boring, but then I suppose that's the way school classes are supposed to be... This year I've been working at McDonald's so I can buy some new clothes and a stereo set. The work isn't all that hard or exciting, but still it makes me feel on my own and that I'm an adult person, that I'm doing something useful. In school, you never feel that way. Not ever. (p. 202)

This is not an unusual reaction. In 1980 the High School and Beyond survey estimated that a majority of seniors nationwide considered their present or most recent job "more enjoyable than school" (Jones and others, 1983b, p. 8-19).

As a method of preparing them for work roles, barring students from activity that produces something useful for other people makes as little sense as training musicians without ever letting them produce music. Separating education from production is also not an effective method of academic education, as John Dewey persistently pointed out. The lack of immediately useful applications reinforces teenagers' sense of separation between school and the "real world." This could well be an important reason for the widespread lack of interest in school work among high school students, which high school teachers and principals consider their biggest problem (Goodlad 1984, p.72; Abramowitz and Tenenbaum 1978, p. 86). The fact that high school students typically report spending as much time watching television during one *weekday* as they spend on homework during the whole *week* (Jones and others 1983, pp. 8-18, 8-33) likewise suggests little motivation to do school work.

In spite of these and other sad statistics, and in spite of all the ink spilled on the subject of school reform, there has been little interest in confronting the basic paradox itself. For instance, the otherwise excellent analysis of High Schools and the Changing Workplace by a committee of the National Academy of Sciences (1984) did not question the basic institutional split between education and production. Where this separation has been recognized as a problem, the remedy usually suggested has been to let students spend some of their "school time" off campus getting "real world" experience (Boyer 1983, O'Toole

1977, President's Science Advisory Committee 1973). This is like allowing music students to play their instruments only outside class. It is better than not letting them make any music at all, but it would still leave them to wonder why no music in music class. Why no practical applications *in* high school?

There is an obvious historical explanation. In the United States the transformation of the high school from an elite to a "mass" institution, the enforcement of compulsory schooling and child labor laws, and the passage of minimum wage laws all occurred with the transition from a predominantly rural and agricultural to a predominantly urban and industrial economy, in the period from roughly 1890 to 1935. As the hierarchy of jobs in the industrial economy took shape, schools were seen as places to keep children safe from the dangers of low-level work in factories and sweatshops, as well as to keep children from competing for jobs against adult men, and also to nourish hope for able children to rise into the ranks of managers and professionals. In spite of John Dewey and others, the high school remained organized on the classical, subject-centered model that prevailed when it was still an elite institution. It is still organized that way, in large part because most colleges and universities are. So today, as Sizer (1984) put it:

> "Taking subjects" in a systematized, conveyer-belt way is what one does in high school. ... The adolescents are supervised, safely and constructively most of the time, during the morning and afternoon hours, and they are off the labor market. That is what high school is all about. (p.83)

Yet, around the edges of "school time," during summers or after school, most high school students now do manage to get into the labor market. Recent surveys in the United States have found that 50 to 60 percent of high school students are holding paid jobs at any given time, and 80 or 90 percent of the seniors have held at least one paid job at some time during their high school years (Lewis and others, 1983; Lewin-Epstein, 1981). In fact, a careful analysis by Meyer and Wise (1982) of longitudinal data on high school graduates found that the amount of part-time work experience while in high school was more strongly correlated with later success in the labor market than was the number of vocational classes taken.

However, we do not conclude, as Meyer and Wise do, that providing more part-time jobs for high school students is a better way to prepare them for work than continuing to provide vocational classes. For one thing, Meyer and Wise themselves note that their finding might be attributable to self-selection of students--the more employable students getting more part-time work, and the less employable taking more vocational classes--rather than to any changes that work experience or vocational classes may actually cause in the students' prospects for success. Furthermore, a series of studies by Ruggiero, Greenberger, and Steinberg (1982; also Greenberger and Steinberg, 1981; Steinberg 1982) has raised serious questions about whether adolescents' part-time work experience always produces beneficial effects. Instead of developing productive skills and positive attitudes, these studies found that some jobs give students practice in stealing and malingering, and

reinforce cynical attitudes toward work. Finally, vocational classes and work experience are not necessarily alternatives. There are many examples of programs that combine both.

We do recommend that the state continue to sponsor vocational classes in high schools. *But we also recommend that the purpose of these classes should be to increase the productivity of all students throughout their entire working lives--not to train only the less bookish students for specific entry-level jobs.* The institutional split between education and production makes it difficult for high schools to train students for entry-level jobs, and the evidence shows that, in fact, high school vocational classes have not been effective in doing it. Rather than persist in trying to do what they are not well situated to do, we recommend instead that high schools reaffirm the broader purpose of vocational education: to prepare all young people for a working life during which they will continually have to think, learn, and communicate. This implies integrating education and productive activity within the school program.

Reintegrating Education and Work in the High Schools

Recommendation 1: To prepare young people for a working life of continual learning, problem solving, and communicating, we recommend that high school vocational education become what we call "enterprise training."

This would incorporate the following five features:

1. Combine production with education. Students should engage in producing goods or providing services that have value or use to someone other than themselves. Some vocational classes already do engage students in such productive activities as running a restaurant, building a house, or operating a child care center. There is evidence that these school-based enterprises can provide work experience of high quality (Stern 1984). We recommend that the scope of these productive efforts be expanded beyond the current range of activities, which ostensibly are designed to prepare students for entry-level jobs. For example, students can run recycling centers, tutor younger children or students of their own age, assist elderly shut-ins, rehabilitate houses, plant trees, clear streams, record oral histories, publish books or periodicals, produce programs for radio or television, do feasibility studies of proposals to conserve energy or water, help local communities prepare against major earthquakes, conduct agricultural experiments, build and repair furniture for schools and other public agencies, and many more things. The National Commission on Resources for Youth, a nonprofit organization, has documented "thousands" of projects like this (Kohler 1981). According to Rosenfeld (1984), combining education with production has been an important feature of traditional programs in vocational agriculture.

Not all such activities can be conducted on campus. Schools may choose to send some students off campus, under supervision of school staff, or by arrangement with other

agencies. If students are placed off campus, they should be sent in groups of two or more (see below).

2. Include all students in vocational education. There is a great deal of merit in Boyer's (1983) call for a "new Carnegie unit" of service to be required of all high school students. Participation in the new vocational education we are describing would accomplish much the same thing. Either by providing strong incentives or by direct mandate, the state should induce local districts to include a year of vocational education in the requirements for high school graduation.

3. Teach teamwork. One of the absurdities that result from the separation of education and production is this: in school, students are evaluated entirely on individual performance, but in most workplaces success depends on people working together. In small organizations, rigid separation of responsibilities is not possible. In large bureaucracies it is increasingly recognized as undesirable.

A 1982 survey by the New York Stock Exchange found that, in U.S. corporations employing at least 100 people, 54 percent of employees worked in companies that had adopted some kind of program to encourage more sharing of responsibility, for instance, quality circles, job rotation, or participatory goal-setting (New York Stock Exchange, 1982). Robert Reich (1983) has argued that more collaboration and sharing of responsibility is inherent in the kind of "flexible-system production" on which the U.S. economy will have to rely in order to remain competitive. Yankelovich and Immerwahr (1983) present evidence that such changes are necessary to accommodate a new work ethic among employees.

For these reasons the National Academy of Sciences (1984) report on High Schools and the Changing Workplace, the Employers' View included skill in "interpersonal relationships" among the "core competencies" that high school graduates need. This includes the ability to "participate in reaching group decisions," "handle conflict maturely," "offer and accept criticism constructively," and "demonstrate respect for the opinions, customs, and individual differences of others" (p.25).

Students cannot learn these things by instruction and example alone. They must practice. To provide practice in teamwork, students should be assigned some tasks in groups of two or more. In vocational classes that operate productive activities on campus, this tends to happen naturally. But if students are placed off campus as part of their vocational education, sending and supervising them in groups will represent a deliberate departure from the usual procedure in work experience programs, where students have individual placements.

4. Integrate vocational and academic education. Since we are proposing that the main purpose of vocational education should not be to train for specific entry-level jobs, it

should become easier to break down the barriers between academic and vocational courses. There are many conceivable combinations that might excite both students and teachers, for example, agriculture and biology, chemistry and photography, drafting and geometry, physics and auto mechanics, food services and foreign languages, distributive education and English, child care and psychology, accounting and economics, carpentry and history, machine shop and algebra, and more! Through practical application, theoretical ideas can come alive for students. Vocational education should no longer be seen as another set of subjects competing for students' time. It should be a set of activities that help students use, understand, and appreciate what they are learning in other courses. This kind of vocational education will increase students' long-term productivity as workers by encouraging them to understand the theory underlying the work they do.

Such theoretical understanding has a very practical importance for people at work, as illustrated by the 1983 strike of telephone workers during the scheduled breakup of AT&T. The key issue in that strike was employment security. The union, Communications Workers of America (CWA), eventually won a set of provisions to protect workers against loss of employment due to organizational and technological change. One important clause provides training that is "generic in nature as opposed to job specific" (World of Work Report, December 1983, p. 93). An example of such training was provided by a program started in 1981 by CWA Local 7201 and the local telephone company in St. Paul, Minnesota. That program offered 400 hours of training in such basics as the theory of semiconductors and circuitry (Business Week, September 5, 1983, p. 33). Clearly, telephone workers and their union have realized that employees need some theoretical understanding of their work in order to remain productive and employable in the long run.

5. Encourage active inquiry. Engaging students in productive applications of theoretical information should imply that students conduct active inquiry. We want to emphasize this by making it explicit. Schools often reward students for performance of assigned tasks in which students exercise little discretion, initiative, or imagination. Students are tested on retention of information selected by the teacher, and on solution of problems formulated by the teacher or the textbook. All this is necessary, but it is not sufficient to develop active learners. Vocational education should give students practice in asking their own questions. This is an essential part of learning to learn.

The National Academy of Sciences committee

> attempted to project the future of the American job market to determine the sort of worker who will prosper in the future. It has asked its employer members to describe the employees they will need, and be able to employ, in the years ahead. A single answer comes from both sources: a person who is able and willing to learn throughout a working lifetime. (p. 17)

The committee further specified the following required skills, among others, in reasoning and problem solving: "identify problems. . .adjust to unanticipated situations. . .work out

new ways of handling recurring problems. . .determine what is needed to accomplish work assignments" (pp. 20-21). If earning a living is increasingly going to require continual learning, then vocational education should increasingly emphasize learning to learn.

Teaching Job-Specific Skills in ROC/ROPs

If high schools stop trying to teach specific skills for entry-level jobs, where will young people get this kind of training?

Recommendation 2: Shift training of specific skills for entry-level jobs in total to ROC/ROPs.

Demonstrably, ROC/ROPs have the greater capacity to provide training of specific skills for entry-level jobs. It would also be good if more ROC/ROP courses in the northern part of the state could be given in the late afternoon, evenings, weekends, and summers. This would allow students who seek job-specific training to get it without having to sacrifice part of their high school day.

Recommendation 3: With regard to skill training at the ROC/ROPs, we recommend changing the basis of accountability to the creation of a job-ready student.

Presently, the chief criterion of success for school programs that teach specific job skills is placement of graduates in jobs. (Continuation of graduates into further education also counts as a success.) There are several things wrong with job placement as a criterion: (a) It emphasizes a result over which vocational educators have very imperfect control. A good vocational program will produce skills up to a standard for employment, but it cannot guarantee a job in a bad labor market. (b) The criterion places excessive emphasis on getting a first job and not in building capacity for a good career. (c) Under the practice of statistical discrimination, the criterion discourages vocational educators from enrolling low income and minority youth, for it is assumed that those students will have difficulty in entering the labor market. (d) The data requirements of the criterion are beyond the capacity or inclination of vocational educators to reach.

Accordingly, we propose that the criterion of accountability become simply the creation of a "job-ready" student. Some ROC/ROPs have already begun to adopt competency-based curricula, awarding students certificates that show exactly what skills they mastered. Further development of competency-based instruction has occurred under the federal Job Training Partnership Act (JTPA), which directs each local Private Industry Council (PIC) to develop sets of competencies for its youth training programs. Programs are responsible for developing competencies in at least one of four major areas:

> Pre-Employment Competencies: basic awareness of the world of work, including familiarity with a variety of career options, the level of education required to pursue each, and the likely income that can be expected from each; an

understanding of one's own preferences, interests, and aptitudes; basic survival skills, including how to open a checking and savings account, rent an apartment, obtain a social security card, make knowledgeable purchases of basic consumer items, and so forth; job search skills, including preparing a resume, knowing where to look for job opportunities, filling out an application, and being interviewed.

Work Maturity Competencies: demonstrated abilities to meet employers' expectations of basic responsibilities, such as regular and punctual attendance, proper dress, ability to carry out instructions, ability to work with others, and so forth.

Basic Education Competencies: skills in reading, writing, computing, and communicating needed to function successfully in the workplace, with an emphasis on demonstrated ability to apply these skills in real work situations.

Job Specific Competencies: basic and advanced skills required to perform effectively in a chosen occupation or cluster of occupations.

Each program must develop a set of specific, measurable competency statements along with appropriate "benchmarks" that establish an acceptable level of performance for each competency. Successful completion of the program, therefore, depends entirely on reaching the benchmarks that have been established for it, and the effectiveness of a program can be assessed by the number of successful completions it achieves. To these four, we also recommend adding a fifth "outcome" indicator, measures of programs' accessibility by minorities, the handicapped, the disadvantaged, and men and women enrolled in program areas not traditionally chosen by their sex.

Along with these major recommendations, we propose some more specific, supplemental changes to enhance the entrepreneurial operation of ROC/ROPs.

Recommendation 4: The state should establish a fund to match gifts from employers dollar-for-dollar.

This would mean, of course, that gifts in kind would need to be appraised to establish a dollar value, but this is not an insurmountable problem.

Recommendation 5: High school students should be allowed free passage across ROC/ROP attendance boundaries, with the result that they would have greater choice of program.

Presently, adults and out-of-school youth are allowed to do this but students enrolled in high school are not.

Recommendation 6: The state should establish a system of incentive awards relative to the number of job-ready youth that a given ROC/ROP graduated each year.

Indeed, the state could make one payment at the time of enrollment of a student and another at the time that the student attained job readiness. An extra bonus could be granted for the attainment of job readiness by low-income and minority youth.

Summary

We propose fundamental change in vocational education at the secondary level. Comprehensive high schools should stop trying to provide skill training for entry level jobs--a task they are not well situated to do--and instead should use vocational education to prepare young people for a working life of continual learning, problem solving, and communicating. To accomplish this broader purpose, vocational education in high schools should move toward what we call "enterprise training." This would combine education with actual production, include all students at some point in their high school career, teach teamwork, integrate vocational with academic curricular content, and encourage active inquiry. The success of "enterprise training" would be measured by lower dropout rates, improved performance in academic subjects, and lifelong gains in productivity at work.

To provide training in specific job skills for high school students, ROC/ROP programs should continue. We recommend, however, that evaluation of these programs put less emphasis on job placement and more on students' attainment of measured competence.

We have no illusions about the immediate feasibility of implementing these recommendations. The first task is to build a consensus that such changes should occur. We see this report as a step in that direction.

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